Volume 94 Number 19

STEEL

Production • Processing • Distribution • Use

The Week in Perspective

YOUNG BLOOD IN THE AMALGAMATED association may be hot but it is methodical. It has forced veteran leaders to agree to this program: Demand recognition for individual lodges from steel producers on May 21; declare a "holiday" June 20 if refused. Amalgamated strength is not sufficient to give the industry the jitters. p. 12

FORGING STEEL BY EXTRUSION, an outgrowth of the manufacture of projectiles, has made rapid strides in the past 15 years, with the result that today these specialty products are finding wide industrial applications. p. 25

STEEL ARCHITECTURE of striking and unusual types was incorporated in prize winning designs submitted in a French competition for the best plans for a large exhibition hall. Semi-stainless steel was specified widely. p. 28

MOTOR TRAINS of the stainless steel, streamline type pay tribute to the resources of the American steel and metalworking industry in the application of recently developed materials and methods. The new rolling equipment makes radical departures from traditional design and construction. p. 30

LUGGAGE HARDWARE is an important outlet for small steel stampings and for one manufacturer has provided the nucleus around which has been built a business in a variety of large and small stampings and assemblies of steel and other metals. p. 39

SKIP HOISTS have not been so busy in three years. The April pig iron report discloses a net gain of 12 stacks in blast, making 109 active. p. 15

PRESIDENT ROOSEVELT'S abilities as a harmonizer will be taxed in adjusting the labor situation. In his now-famous settlement of the threatened automobile strike he agreed to representation by all groups of labor; national labor board stands for majority representation only. p. 16

SIXTY PER CENT! This coveted point steel operations reached last week on the way up. At this level, incidentally, red ink changes to purple, if not black. It's the best rate for steel production since midsummer of 1930. p. 15

IN TWO AND ONE HALF WEEKS the steel clan will gather again, for the spring meeting of the American Iron and Steel institute. Charles M. Schwab, as president, will lead off the speakers, with a real basis for being optimistic. p. 13

RETAIL LIQUOR STORES are proving a boon to the steel industry, for storage and dispensing equipment is fabricated almost entirely from steel. Adjustable wall shelving and service counters—the latter using stainless trim, are the largest items. p. 43

HENRY FORD may not only reduce his new car prices but also is reported considering a unique guarantee. He may seal his engines and guarantee them against any adjustment except to carburetor and to distributor points for 40,000 miles! p. 18

MODERN STEEL FURNITURE is becoming well established in public favor. Seamless tubing from ¼ to 2 inches diameter constitutes the framework; surface finish is a heavy plating of either chromium or cadmium. p. 40

RAILROAD CAR BUILDING is undergoing a revival. In the shops of one large railroad, in which a large number of all-steel automobile, flat and standard box cars are being constructed, assembly is progressive much the same as on the assembly lines of an automobile plant. p. 45

VENTILATING FANS, in a variety of sizes suitable for industrial and home use, are constructed largely of iron and steel. Annually they account for substantial tonnages of rolled and cast materials. p. 46

Recognition by June 20 or Strike, Amalgamated Warns

FORMAL demand for recognition will be made on May 21 by each lodge of the Amalgamated Association of Iron, Steel and Tin Workers, which has been the principal agency of the American Federation of Labor in attempting to organize iron and steelworks labor.

Until June 20 will be given for reply, and a nation-wide "holiday" is threatened in event the mills refuse.

This program was adopted last week on the final day of the Amalgamated convention in Pittsburgh. It was put over by the younger and more radical elements of the association, which more than once threatened to bolt, and apparently over the sentiments of M. F. Tighe, president, and other veteran leaders of the Amalgamated.

Some 225 lodges—most of them newly organized—constitute the Amalgamated's strength. Prior to the impetus supplied to organized labor by NIRA, the Amalgamated functioned principally in a comparatively few unionized bar iron and sheet mills.

Busy Season Selected

The threat of a strike on June 20 aims at what promises to be the busiest season for iron and steel mills since recovery set in. Under the steel code, specifications against second quarter contracts entered prior to price advances of $3 and more per ton must be rolled and all shipments made by June 30.

By late June consumer stocks are expected to be built up to a high level, owing to the price advance, and mid-summer usually brings a marked cessation in consumption. Hence the timing of the strike coincides with the approach to the period of the year when consumers would be least pinched.

Primaries for next year's election to Amalgamated posts will be held June 21, with the general election scheduled for late September. William J. Long, organizer figuring in the Weirton Steel Co. labor controversy, appears to be groomed for a high post by the new and younger element in the Amalgamated.

Other results of the Amalgamated's meeting were: A cut in dues from $1.25-$3 per month to a 66-cent-$1.25 scale, this being designed to increase membership; virtual abolishment of union death benefits; recommendation to eliminate strike and lockout benefits.

Answering a charge that communists had dictated this strike threat, Mr. Tighe said last week: "I believe all of our men are loyal to the organization and would not knowingly further anything of a communistic nature, but in their enthusiasm some of the younger fellows might be victimized."

Eight thousand iron ore miners in the Birmingham, Ala., district went out on strike Friday demanding recognition of their union for collective bargaining. This followed closely an adjustment of difficulties with coal miners, whose holiday caused some irregularity in blast furnaces early in the week.

Labor at both coal and ore mines is principally colored, and has been disaffected by NRA efforts to eliminate the differential for southern labor. In general, southern iron and steel works have ample supplies of fuel, ore and pig iron and some plants are fortified for two months.

A fresh sore spot developed last week at the Duquesne, Pa., plant of the Carnegie Steel Co., when approximately 1500 employes petitioned the national labor board for an election to determine employe representation. The board unanimously granted the petition, with the form, method and procedure to be determined and announced later. Early this year, of the 2846 Duquesne employes voting on broadening of the company employe plan 1854 voted "yes," 748 voted "no" and 244 ballots were void.

At least a partial victory for industry is indicated by Senator Wagner's statement Friday that he will not prohibit company unions, though safeguarding against company control of unions, in a compromise bill. He still advocates a permanent mediation board.

Meet on Steel Code Revision; Delay on Structural Code Irks; New Jersey Acts

DIRECTORS of the American Iron and Steel institute were to go into conference in New York Monday, May 7, to consider revising the steel code. Donald R. Richberg, NRA counsel, and Division Administrator Simpson probably will receive recommendations instead of meeting with the institute.

Principal topics scheduled for consideration were (1) addition of more basing points and (2) an adjustment in the waiting time after the filing of prices.

NRA does not appear to be taking the initiative in proposing any definite modifications in the steel code, effective May 31, when the present period expires. The feeling in NRA is that the existing code is generally satisfactory, requiring only certain modifications to eliminate grounds for complaints such as set forth in the recent report of the federal trade commission and the review board of NRA, which reported Friday to the President on eight codes, including steel.

However, broadening the number of basing points to include practically all producing points would radically alter price and market relationships and put the industry almost entirely on an f.o.b. mill basis.

¶Meanwhile, the continued failure of the structural steel code to win approval is troubling the industry. For one thing, the Central Fabricators' association, comprising 75 per cent of the independent structural shops in Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska and Wisconsin, has filed with General Johnson a protest against provisions of the steel code which permit the dumping of steel from one mill territory into another.

The association, of which H. E. Brenchley, Minneapolis-Moline Power Implement Co., Minneapolis, is president, maintains that mills are selling steel outside their logical territories at $3 to $8 a ton below prices charged to customers located in their own territories.

¶And in New Jersey what is believed to be the first state code for regulating the structural steel and iron fabricating industry was ap-

proved by Governor Moore, effective April 23.

Sponsored by the Structural Steel and Ornamental Iron Association of New Jersey Inc., of which Elias A. Kanter, of Newark, is counsel, the code sets a minimum wage scale of 50 cents an hour for common labor, and prescribes a 40-hour week. One of the important provisions of the code is that members are not permitted to take any work for less than a reasonably estimated price.

Each member of the industry is required to send a copy of his bid on each job to the code authority, with a copy of his summary main sheet showing how the bid was arrived at and the names of the low subcontractor and supply bid.

Headquarters of the code authority, on which are seven members of the state association and three appointees of the governor, have been set up in the Industrial Office building, Newark, with Amos H. Radcliffe, chairman.

¶Last week the entire NRA code matter became more confused. It was whispered in Washington that the President, recognizing that codes had retarded recovery and re-employment in some directions, was preparing to relax his program. On the other hand, General Johnson in addressing a convention announced a swift campaign, in June and July, to revive lagging interest in codes.

Canada

DOMINION BRIDGE CO., Montreal, Que., is announcing that as a result of its success in building the new Caughnawaga bridge across the St. Lawrence river with Canadian steel, it is effecting its independence from foreign sources of supply.

Heretofore, much of the structural steel used by bridge companies in Canada was purchased outside the Dominion, the market being too slender to support the manufacture of heavy sections and big angles. Welding of the smaller Canadian-rolled sections is said to be satisfactory.

¶Frost Steel & Wire Co., Toronto, Ont., is taking over the inventories at Ojibway and Hamilton, Ont., and Winnipeg, Man., of the Canadian Steel Corp., a subsidiary of the United States Steel Corp. The Ojibway plant was formally closed last year and its inventories, now being disposed of, include principally fencing and wire products.

PWA

ONCE more dreams of an enormous power plant, harnessing tidal forces in the Bay of Fundy, and an aluminum and stainless steel plant at Passamaquoddy, Me., consuming most of this power, have been shattered. The PWA board of review has disapproved this $47,000,000 project, which previously had been turned down by the federal power commission.

Institute

AMERICAN IRON AND STEEL INSTITUTE has announced its program for its spring meeting May 24 at the Hotel Commodore, New York: Opening address by Charles M. Schwab, president; "Operation of the Iron and Steel Code," by Walter S. Tower, executive secretary. Afternoon session: "Progress and Outline of the Work of the Technical Committees," by L. S. Marsh, manager, department of metallurgy and inspection, Inland Steel Co., Chicago; "Progress in Welding of Steel," by Everett Chapman, vice president in charge of research, Lukenweld Inc., Coatesville, Pa.; "Some Characteristics Common to Carbon Steel and Alloy Steels," by E. C. Bain, metallurgist, research laboratories, United States Steel Corp., Kearny, N. J. Banquet speakers are yet to be announced.

¶Commercial Resolutions 33 and 45, of the American Iron and Steel Institute, as amended April 27, make an exception in the trade practice of forcing consumers to take shipments on contracts before the end of the quarter. The exception is in relation to track accessories, and also on materials sold to manufacturers of track accessories.

Previously, orders for these materials had to be placed prior to April 15 and had to be delivered prior to the end of June. The amended resolutions permit placing of these orders up to June 1 and delivery up to Aug. 31.

Transportation

SEVERAL bargeloads of steel left Pittsburgh mills April 29 for Lake Charles, La. The shipment is moving down the Ohio river to the Mississippi and thence 250 miles westward of New Orleans via the intra-coastal canal. The Union Barge Line Corp.'s steamer C. W. TALBOT has the tow in charge, it being believed that this is the farthest into the southwest that Pittsburgh steel products have moved by all-water routes.

¶Twelve bargeloads of steel products are enroute to Memphis, Tenn., in charge of Jones & Laughlin Steel Corp.'s Ohio river steamer VESTA, having left Aliquippa, Pa., last week.

Contests

KR. DARRAH, a student at Rensselaer Polytechnic institute, Troy, N. Y., won first prize in the sixth annual bridge design competition held by the American Institute of Steel Construction, New York. George Pistey, also a student at Rensselaer, won second prize.

THE TRAIN OF MAGIC AT THE HOUSE OF MAGIC: When the Burlington railroad's new streamlined stainless-steel "Zephyr" (pp. 30-34) visited Schenectady, N. Y., recently it was at the source of all its electrical apparatus—the General Electric Co. It was in keeping with the advance spirit of the times that the "electric eye" counted the number of visitors. General Electric photo

First honorable mention was given to David Hiat, of New York university; second honorable mention to J. F. Novak, of Rensselaer; and third honorable mention to Albert R. Nozaki, of the University of Illinois.

The problem was to design a steel tower for a small highway suspension bridge. In addition to giving the students certificates of award, the first prize this year carries a cash compensation of $100 and the second prize $50.

NRA

IN PRESCRIBING a budget form for code authority expenses, NRA Administrator Johnson has ruled that where a single employer operates under two or more codes he will be required to contribute only to the maintenance of the code authority representing his principal line of business, with some exceptions.

The budget not only sets up a basis for expenditures but also provides for assessments based upon unit or dollar volume of sales, a production basis involving volume of raw material consumed, units of production used or production payroll, and a general plant basis of assessment.

¶Code hearings: Mechanical press manufacturing, gas-powered industrial trucks, and v-belt drive, May 10; wiring devices, May 14; saw and steel products manufacturing, May 16; electro plating and metal polishing and finishing, May 18.

¶Code for the spray painting and finishing equipment industry, effective April 30 provides minimum factory wages of 40 cents an hour for men and 35 cents for women, with a maximum 40-hour week and 8-hour day and sets up a code authority of eight.

Financial

ALLEGHENY STEEL CO., Brackenridge, Pa., reports net profit of $293,954 in the first quarter, after depreciation, taxes, etc., compared with loss of $11,257 in the fourth quarter of 1933, and loss of $131,937 in the first quarter of 1933.

¶Granite City Steel Co., Granite City, Ill., shows net loss of $18,441 in the first quarter, against loss of $80,325 in the same quarter of 1933.

¶Eastern Rolling Mill Co., Baltimore, shows net loss of $4715 for the first quarter, contrasted with loss of $65,888 in the like period of 1933.

¶Colorado Fuel & Iron Co., Denver and Pueblo, Colo., and subsidiaries, for the quarter ended March 31 showed a net profit of $273,041, after taxes, interest, depreciation, etc., against loss of $750,695 in first quarter of 1933. In the first quarter of 1934 no interest was provided for on funded debt. Interest charge for 1933 was in respect of interest paid or accrued to April 1, 1933. Bond interest of $134,127 accrued in January, 1933, was paid; bond interest accrued in February and March was not paid.

¶Superior Steel Corp., Pittsburgh, reports net loss in the first quarter of $6266, against a $172,337 loss in the first quarter a year ago.

¶Vanadium-Alloys Steel Co., Pittsburgh, has declared the regular annual dividend of 25 cents a common share.

¶Correction: Rustless Iron & Steel Corp., Baltimore, showed a net profit of $15,496 in the ten months ended Dec. 31, 1933, instead of a loss as reported in the April 30 issue.

Meetings

ADVANCE sale of exhibit space in the 1934 National Metal exposition to be held in the Port Authority building, New York, Oct. 1-5, is the heaviest in four years, according to W. H. Eisenman, Cleveland, director of the exposition and secretary of the American Society for Metals, the principal sponsoring organization.

This will be the first Metal exposition to be held in New York. Both in number and in size, exhibits will be greater than in any year since 1929. Thus far, floor plans and reservation blanks have been distributed only to past exhibitors; general distribution will begin about May 15.

Plans for the National Metal congress, to be held simultaneously with the exposition, are developing rapidly. In addition to the American Society for Metals, the American Welding society, Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers, and the Wire association will sponsor technical programs.

¶Purchasing Agents Association of St. Louis will hold its fourth annual exhibitors' night May 24 in the Jefferson hotel, St. Louis. More than 75 firms in the St. Louis manufacturing district are expected to show their products for the benefit of purchasing agents and other executives. Five hundred will attend a dinner in connection with the exhibition.

Labor

EMPLOYMENT in the steel industry in March reached 90 per cent of the peak of 1929 when 15,166 wage earners were re-employed, making a total of 380,471 workers on hourly piece work or tonnage wages. This was an increase of 15,466 over February. Including salaried employes, total steel employment in March was 419,277.

From February to March, average earnings per hour increased from 58.7 cents to 58.9. Average hours per week per employe was stepped up from 31.9 to 33.3, and total wages paid during the month expanded from $27,394,221 to $33,010,060. March statistics do not reflect the 10 per cent wage increase effective April 1, the American Iron and Steel institute states.

¶All last week legal counsel for the Weirton Steel Co. and the department of justice contended in the federal district court at Wilmington, Del., on the charge of the government that the Dec. 15 election of employe representatives at Weirton plants violated the spirit of NIRA.

Government counsel charged intimidation and inducements to employes to win their favor; Weirton officials maintained any intimidation was on the side of representatives of outside unions. Weirton officials invoked the Norris-LaGuardia act, heretofore regarded as a labor anti-injunction measure, and turning the tables. No decision was reached.

¶Agreement between automotive employers and employes, effected last week at Detroit by the automobile labor board, obviated a decision on a petition by employes of the Fisher Body Co., in Cleveland, for an injunction which would have been the first of its kind.

It has been common practice for employers to attempt to enjoin picketing, but never before have employes, as in the Fisher case, themselves gone to court and sought relief. Fisher employes taking this action were officials and representatives of the company's co-operative association. Defendants were union officials and members who would have been liable as union officials and individuals for damages.

Automobile manufacturers apparently set the pattern for all industry when in obtaining President Roosevelt's settlement of the threatened automotive strike two months ago they won their point that all groups of employes should be represented, and not merely a majority. Employers involved in the gasoline station strike in Cleveland last week won a similar concession—contrary to the attitude of the national labor board, which maintains that employers should treat only with representatives of a majority.

¶William Green, president, American Federation of Labor, April 30 asked President Roosevelt to push the Connery 30-hour work week bill, claiming 10,000,000 persons are idle despite re-employment of 3,000,000 by codes.

¶National industrial conference

board report on unemployment in March is 8,021,000, a decline of 589,000 from February, and 5,182,000, or 39.2 per cent, from March, 1933, the peak. American Federation of Labor estimates unemployment in March at 10,905,000.

¶Result of a national labor board election at the Hughes Tool Co., Houston, Tex.; 787 for the machinists union, 515 for the company welfare organization.

¶Thew Shovel Co., Lorain, O., increased wages 10 per cent May 1.

¶A wage advance ranging from 3 to 6 per cent for May and June has been granted voluntarily by members of the Western Bar Iron association having contracts with the Amalgamated Association of Iron, Steel and Tin Workers. This was accomplished by advancing the card rate to 1.90c on the boiling and all bar mill scales, and to 2.00c on the guide, 10-inch and smaller mills.

Last September when the steel industry generally put in effect a 15 per cent wage advance the bar iron association also raised wages 15 per cent, irrespective of the average sales price of bar iron on which the rates were based. The new card rates conform approximately to the current steel bar selling prices and place the association back on the sliding scale.

Production

STEEL production reached 60 per cent last week, highest since late June, 1930, on the strength of 2 to 3-point rises in the Pittsburgh, Chicago, Youngstown and eastern Pennsylvania districts. Other districts were unchanged except for a reduction of 2 points at Buffalo. This week, Youngstown and Pittsburgh will again increase, indicating a fur-

(*Please turn to Page* 60)

APRIL IRON PRODUCTION

	No. in blast last day of month Apr.	Mar.	Total tonnage Merchant	Non-merchant
Ohio	30	26	84,963	402,616
Penna.	33	28	63,475*	438,719*
Alabama	10	10	54,758	75,497
Illinois	8	7	34,691	96,147
New York	8	8	45,635	75,223
Colorado	1	1		
Indiana	8	6	624	241,851
Maryland	3	3		
Virginia	0	0		
Kentucky	1	1		
Mass.	0	0		
Tennessee	0	0		
Utah	1	1	3,365	118,653
West Va.	3	3		
Michigan	3	3		
Minnesota	0	0		
Missouri	0	0		
Total	109	97	287,511*	1,448,706*

*Includes ferro and spiegeleisen.

April Blast Furnaces Are Highest in Three Years

PRODUCTION of coke pig iron in April continued on the upward swing started five months ago and operating blast furnaces reached a total of 109, the highest since April, 1931, when 113 were active. The highest point reached in 1933 was 105 furnaces, in August.

Average daily output in April was 57,873 gross tons, a gain of 5435 tons, or 10.3 per cent, over the 52,438-ton rate of March. This was the best production since last August, with 59,137 tons.

Total production in April was 1,736,217 tons, which, compared with the 1,625,588 tons of March, was an increase of 110,629 tons, or 6.8 per cent. Incidentally, April was a one-day shorter month than March. The April output was the best since last August with 1,833,265 tons.

For the first four months of 1934, output has aggregated 5,858,240 tons, a gain of 3,570,769 tons, or 156 per cent, over the 2,287,471-ton total for the same period of 1933.

During the past four months, operating blast furnaces have increased 35—from 74 on Dec. 31 to 109 on April 30. On April 30, last year, only 48 stacks were in production. The April total was a gain of 12 over the 97 in blast on March 31. During the month, 14 furnaces were returned to activity and only 2 were blown out or banked. Of the non-merchant or steelworks class, 12 were blown in and 2 were blown out; of the merchant class, 2 in, none out.

Relating production to capacity, the operating rate for April was 42 per cent, compared with 38 per cent in March. The April rate was the highest since last August with 42.8 per cent.

Furnaces resuming in April were: In Ohio: Haselton No. 3, Republic Steel Corp.; Toledo B, Interlake Iron Corp.; Jisco, Jackson Iron & Steel Co.; Lorain No. 1, National Tube Co.; Cleveland No. 1, Otis Steel Co. In Pennsylvania: Cambria J, Bethlehem Steel Co.; National No. 4, National Tube Co.; two Eliza and one Aliquippa, Jones & Laughlin Steel Corp. In New York: Buffalo No. 2, Republic Steel Corp. In Illinois: South Works New No. 10, Illinois Steel Co. In Indiana: Gary No. 7, Illinois Steel Co.; Madeline No. 2, Inland Steel Co.

Stacks blown out or banked during the month were: In Ohio: Hamilton, Hamilton Coke & Iron Co. In New York: Niagara A, Tonawanda Iron Corp.

National Steel Corp. is dismantling the three blast furnaces A, B and C at its Hamburg street works, Buffalo. These furnaces, formerly owned by the Hanna Furnace Co., had an annual capacity of 385,000 gross tons American Rolling Mill Co. is dismantling the Sarah blast furnace at Ironton, O., acquired recently from the Belfont Steel & Wire Co. Its annual capacity was 72,000 tons. The total number of potential blast furnaces in the United States is thereby reduced from 289 to 285.

AVERAGE DAILY PRODUCTION

	1934	1933	1932	1931
Jan.	39,537	18,348	31,336	55,337
Feb.	45,385	19,752	33,122	61,114
Mar.	52,438	17,484	31,194	65,448
Apr.	57,873	20,786	28,524	66,986
May		28,784	25,282	64,355
June		42,165	20,867	54,599
July		58,108	18,394	47,170
Aug.		59,137	17,035	41,264
Sept		50,264	19,788	38,947
Oct.		43,824	20,795	37,831
Nov.		36,124	20,858	36,727
Dec.		38,456	17,650	31,625
Av.	48,818	36,223	23,699	50,035

RATE OF OPERATIONS

(Relation of Production to Capacity)

	1934[1]	1933[1]	1932[2]	1931[3]
Jan.	28.7	13.3	22.1	38.4
Feb.	32.9	14.3	23.4	42.5
Mar.	38.0	12.7	22.0	45.4
Apr.	42.0	15.1	20.2	46.5
May		20.9	17.9	44.7
June		30.6	14.7	37.9
July		42.2	13.0	32.7
Aug.		42.8	12.0	28.7
Sept.		36.4	14.0	27.0
Oct.		31.8	14.7	26.3
Nov.		26.2	14.7	25.5
Dec.		27.9	12.5	22.0

[1]Based on capacity of 50,313,975 gross tons, Dec. 31, 1932; [2]on capacity of 51,598,175 tons; [3]on capacity of 52,515,875 tons. Capacities by American Iron and Steel institute.

MONTHLY IRON PRODUCTION

	1934	1933	1932
Jan.	1,225,643	568,785	971,437
Feb.	1,270,792	553,067	960,550
Mar.	1,625,588	542,013	967,015
Apr.	1,736,217	623,606	855,734
Total 4 mo.	5,858,240	2,287,471	3,754,736
May		892,326	783,769
June		1,264,953	626,015
July		1,801,345	570,222
Aug.		1,833,265	528,105
Sept.		1,507,931	593,640
Oct.		1,358,540	644,648
Nov.		1,083,740	625,753
Dec.		1,192,136	547,179
Total		13,221,707	8,674,067

WINDOWS OF WASHINGTON

Labor Policy Two-Headed

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Favoring Steel for Houses

• • •

Strong for Diesel Engines

WASHINGTON

FOLLOWING the recent feminine invasion, the masculine sex again is in the ascendancy in Washington. The recent annual conventions of the nurses, the Daughters of the American Revolution and the Daughters of 1812 were succeeded last week by those of the United States Chamber of Commerce, the American Trade association executives and a number of other bodies.

This removal of the gentler element may have had something to do with the revival of recent frictions which, it seems, were only temporarily allayed. Rumblings again are heard on the labor front.

The old company union issue has come out of its lair and the perfect harmony which seemingly has prevailed since the President's return from his vacation in the South has been succeded by a situation somewhat less serene.

Senator Wagner's national labor board has defied the President's settlement of the automobile strike. And the split between American Federation of Labor and NRA over General Johnson's attitude on company unions has led to a delicate situation in the national labor advisory board as a result of embarrassment over the general's attitude.

THE position of the national labor board is clearly revealed in a summary of its principles issued by the board for publication. "The representatives selected by the majority of the employes within a given plant or department are the sole collective bargaining agency for the plant or department," says this summary.

This principle, of course, is in complete contrast to that enunciated by President Roosevelt in the automobile strike settlement. The President at that ttime provided for the proportional representation of all labor groups in collective bargaining.

At least, the board is consistent in the application of this principle. Last October the board supervised an election in a plant of the Real Silk Co., Indianapolis, under an election notice which provided that any representative chosen should do the collective bargaining for all employes.

The election was won by the company union, whereupon the American Federation of Full-Fashioned Hosiery Workers demanded that the company bargain with it as well as with the company union, on the ground that as a minority group the professionally organized labor body had the right to bargain with the management. The board has rejected this appeal and recognized the company union as the representative of all the employes.

Thus has been revived a controversial subject whose consequences may prove far-reaching unless this issue is cleared up shortly. In the meantime, the administration labor bill which was to have replaced the original Wagner bill has not yet been finally formulated.

ON THE eve of the launching of the administration plan to stimulate house construction and renovation on a gigantic scale, to be financed by private funds and backed by government-guaranteed mortgages, ideas with respect to the use of steel in the construction of low-cost houses appear to be changing.

There is more of a tendency to consider steel as a building material, rather than in connection with all-steel or part-steel, prefabricated houses. In other words, the use of steel members, in competition with wood and other materials, is regarded as a possibility.

Following is a list of a number of companies whose interest in the promotion of steel houses has impressed Washington: California National Steel Co., Los Angeles; Colorado Fuel & Iron Co., Denver; A. O. Smith Corp., Milwaukee; Truscon Steel Co., Youngstown, O.; American Radiator-Standard Sanitary Corp., New York; Pearce Foundation, New York; H. H. Robertson Co., Pittsburgh; Stran-Steel Corp., Detroit; American Steel Homes Co. and Alan Wood Steel Co., Conshohocken, Pa.; Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; Wheeling Steel Corp., Wheeling, W. Va.; Jones & Laughlin Steel Corp., Pittsburgh; Insulated Steelbilt Structures Inc., Amsterdam, N. Y.; General Houses, Chicago; Gabriel Steel Co., Detroit; Universal Building Corp., Sheboygan, Wis.; Scullin Steel Co., St. Louis; National Bridge Co., Long Island City, N. Y.; Ferro Enamel Corp., Homes Permanesque of America Inc., and Steelbilt Homes Inc., Cleveland; American Rolling Mill Co., Middletown, O.; Universal House Corp., Zanesville, O., and American Houses Inc., New York.

It is understood here that a new composite house, in which steel is an important material, will be announced shortly. A feature, it is said, is that a considerable amount of labor will be required in erecting this house, so that it will be a help in lessening unemployment.

DIESEL engine manufacturers are in the sun and will continue to be for some time to come. The navy, in general, is being dieselized. All navy small boats now are being powered with diesels. Large naval vessels are being equipped with diesel-generator stand-by units for supplying electric current.

The possibilities for diesel engine manufacturers, apparently, cannot be exaggerated. Take the many PWA-financed electric power generating plants for small municipalities. Many diesel-electric units have

generating equipment in such plants. They produce power at a cost which is considerably less than the average billing of the public utilities.

There are pending a great many more of these projects, in which the loans and grants have been allotted, and it is believed that the majority of them will be consummated as planned. In many of these plants duplicate units will be installed to provide for continuous service despite breakdowns.

Then, it is considered in railroad administration circles that the possibilities for increased use of oil-electric drive are enormous. The Lackawanna has just placed four of these drives, two with Winton Engine Corp. and two with Ingersoll-Rand Co. Winton previously had booked three such units for the stainless steel equipment built by the Edward G. Budd Mfg. Co., Philadelphia, and one for the aluminum train built by the Pullman Co.

It is thought here that 3-car trains, driven by diesel-electric units, will be more extensively used in the future to solve the difficulties of the railroads. It is thought that it will be more profitable for the roads to operate 3-car trains, with diesel-electric drive, than the present heavy equipment.

Such trains probably will answer admirably on stretches of road where it would not be economy to electrify, and where the traffic is not sufficiently heavy to justify the use of heavy steam equipment.

On many lines where one or two trains a day now are being operated, for instance, the installation of diesel-electric drive, with short trains, probably would enable the railroads to give more frequent service at less cost and thus attract a lot of passengers who now are traveling in their automobiles.

A large number of these diesels are being made with beds and crankcases of welded plate construction.

ALL manufacturers of agricultural implements, and the manufacturers who supply them, will be vitally interested in a project which the bureau of agricultural engineering, Building C, Seventh and B streets S. W., Washington, now has under way. This is a study of the most efficient practice in soil manipulation. The bureau has an appropriation for bringing in different kinds of soils from all over the United States. Each soil sample will fill a bin 250 feet long and 20 feet wide. On each side will be tracks for mounting the testing equipment.

Wear-resistance of different kinds of steel, the acid attack of each kind of soil, and the efficiency of design of plows and other implements, in terms of these respective soils, will be studied. In Washington, this study is regarded as very important.

It is believed that it paves the way for changing the design of various soil-manipulating tools and the specifications for materials going into the construction of those implements. The study is in the hands of J. W. Randolph, under R. B. Gray, who is head of the bureau of agricultural engineering.

SECRETARY ICKES has not yet stated his definition of what constitutes a 'subcontractor' in bidding for PWA-financed work. He recently ruled that when a contractor put in a bid, he would have to put in the bids from subcontractors on which his bid is based, and that, if awarded the contract, he would have to place the subcontracts with the subcontractors named, and at the prices quoted.

In this way he sought to do away with the pernicious practice of 'bid-peddling' which has resulted in so much cut-throat competition for government work in the past.

While the secretary has issued no clarification as to who will be classed as a subcontractor, it is of interest to note that Abel Wolman, Maryland state engineer, has issued a definition of the term 'subcontractor' in contractors named and at the prices in the state of Maryland.

"The term subcontractor," says Mr. Wolman, "shall be interpreted to include every person or corporation who furnished, or proposes to furnish, labor and/or materials to a general contractor on PWA work, under a definite contract agreement."

Gear Makers Name New Officers

JOHN CHRISTENSEN, pioneer gear manufacturer, was elected president of the American Gear Manufacturers' association at the annual meeting of the organization in Wilkinsburg, Pa., May 3-5. He is one of the founders of the association which had its origin in Lakewood, N. J., 18 years ago. Mr. Christensen is president of the Cincinnati Gear Co., Cincinnati.

A. A. Ross, General Electric Co., West Lynn, Mass., was named vice president and J. Harper Jackson, Pittsburgh Gear & Machine Co., Pittsburgh, was re-elected treasurer. J. C. McQuiston, 221 Penn-Lincoln hotel, Wilkinsburg, Pa., will continue as manager-secretary.

E. P. Connell, Falk Corp., Milwaukee, and Howard Dingle, Cleveland Worm & Gear Co., Cleveland, were named as new directors; E. W. Miller, Fellows Gear Shaper Co., Springfield, Vt., retiring president of the association, and E. S. Sawtelle, Tool Steel Gear & Pinion Co., Cincinnati, were re-elected directors.

In opening the meeting, President Miller contrasted the improved status of business today with that of a year ago. The opening of 1933 did not bring much encouragement, he asserted, but now business is better. Statistics of the gear industry show that there was a little improvement before the middle of 1933, the total for that year being 50 per cent better than that of 1932. Of the entire business for 1933, more than 60 per cent was done in the last half of the year.

Further encouragement, he declared, is to be found in the fact that the first quarter of 1934 reveals an improvement of almost 100 per cent over the corresponding quarter of 1933.

President Miller stated that when he assumed the presidency of the organization two years ago, membership was very much down at the heels. Many companies had been so severely affected by the depression that they had been forced to withdraw their financial support. At present, the membership is more than double that of the low point.

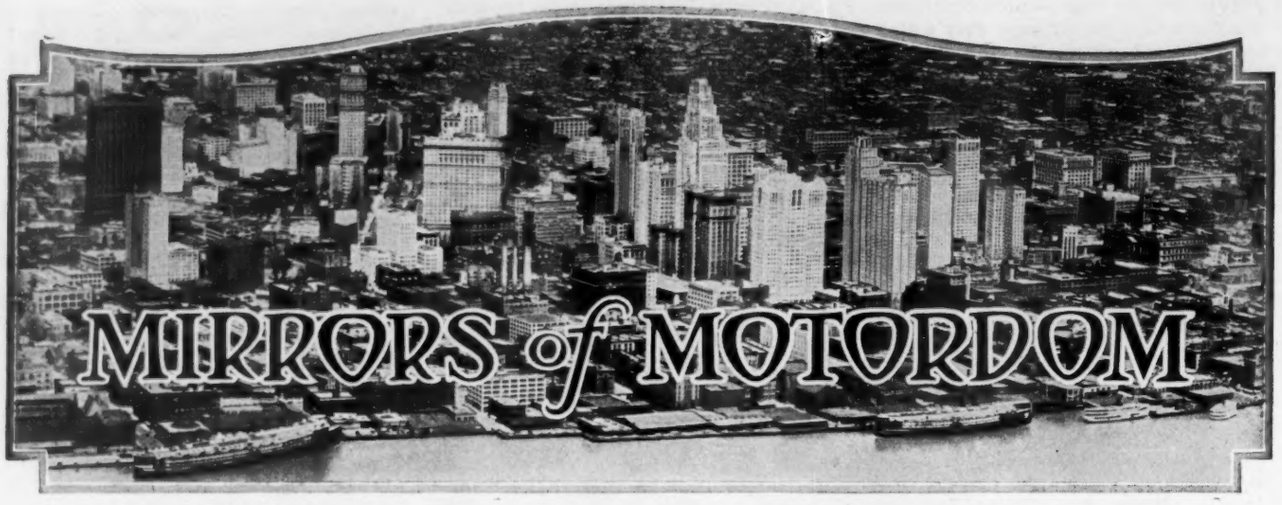
Organizations acquiring full company memberships were announced as follows: Link-Belt Co., Philadelphia; and Bilgram Gear & Machine Co., Philadelphia. New affiliate members are: Indiana Gear Works, Indianapolis; New Jersey Gear & Mfg. Co., Newark, N. J.; Abart Gear & Machine Co., Cicero, Ill.; J. Morrison Gilmour, New York; Moore Gear & Mfg. Co., St. Louis; Hartford Special Machinery Co., Hartford, Conn.; and Precision Gear & Machine Co., Charlotte, N. C. The association's roster now comprises 64 member companies, 10 affiliate members and 12 academic members.

The meeting included several technical and business sessions. On Saturday, the day after adjournment of the Gear Makers' meeting, the entire gear manufacturing industry held a session to discuss code and economic matters. A meeting of the code authority also was held. Reports of these various sessions will be presented in the May 14 issue of STEEL.

Are Low on Gun Forgings

Bethlehem Steel Co., Bethlehem, Pa., bidding 27c a pound, is low on four 6-inch/47 gun barrel forgings for the navy department, bureau of ordnance. Crucible Steel Co. of America, New York, is low on two 5-inch/25 gun forgings at 19.5c a pound and 74 1-inch gun barrel forgings at 55c a pound. At the same price, Crucible is low on 32 1-inch gun barrel forgings included under item four, opening of April 10.

International Nickel Co. Inc. is low on one 3-inch/50 liner forgings at $1.3864 a pound.



Production Is Tapering Off

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Ford To Guarantee Motors?

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Layoffs Are Sobering Labor

DETROIT

THE blue of the law far outshone the communistic red on May Day last week in Detroit's parade-ground for disgruntled orators and labor agitators—Grand Circus park.

What might in other years have been unbridled violence on May Day passed for naught this year because actually some 900 Detroit policemen showed their teeth by keeping would-be rioters nearly outnumbered, and therefore in charge.

Fighting fire with fire, showing troublemakers some trouble, and returning medicine dose for dose, really went deeper last week in Detroit than the throttling of a possibly rampant May Day celebration.

Motor car manufacturers themselves have found that a little physical stiff-arming of what they term "nuisance unions" has recently talked more convincingly than a gesture at friendly parlance across the arbitration table.

There appears to be no surer cure for treating bothersome labor agitors than organized strike-breaking on the part of the automobile manufacturers themselves. The past week to ten days has seen several of the district's labor sore spots eradicated as if by magic through the appearance on the scene of trouble-breaking squads, whose occupation, while professional, might be termed hazardous, yet who talk the same forceful language as strike fomentors.

That strike threats are subsiding even of their own inertia, however, is quite commonly accepted today in Detroit. If, for no other reason, with signs of automobile production being on the late spring wane, automobile employment offices soon, if not already, can pick and choose their workmen.

January's and February's frantic scurry for skilled laborers has left the Detroit scene. With the first layoffs of this season coming through, of which Hudson's last week was typical, a month hence likely will find employment here directly in step with automobile assemblies—that is, at anywhere from 10 to 20 per cent less than each is today.

Little wonder then that a workman's job has regained some of its attraction and has ceased to be flouted. Typical of the underlying trend was the novelty of 28 Fisher Body workmen at Cleveland last week asking for an injunction in the courts to restrain the American Federation of Labor from preventing them from working, or the case in Detroit last week of 35 recalcitrant tool and die strikers suppliantly asking their former boss in one shop for work.

Incidentally, Detroit agrees that MESA, the tool and die union, has lost more than considerable ground through its own internal dissension plus the outside threat that automobile concerns will not make any die changes this year, if threats continue.

BECAUSE inventories of finished cars are higher and dealers now are better stocked, auto makers here pulled their belts in a notch last week and made a slight retrenchment for May. That May's production would ease was generally accepted even as long ago as early April, but the falling off was not expected to be noticeable until after May 15.

At that, Ford's ambitious program—his best for any month of 1934—will be a splendid bolster to the picture. But, excluding Ford, there was scarcely a major producer last week who did not inject a note of caution in production rates by arranging to make fewer cars in May than in April.

Hudson scaled down, Graham went to a six-hour day, Dodge dropped a day a week, Plymouth was slightly easier, both Chevrolet and Pontiac were crippled by their body strike—these were typical of a slight slough motordom wallowed in as May commenced.

But, Ford has added another assembly day, making six weekly at River Rouge, is clicking off better than 5000 cars daily, and seems determined on completing a schedule of 108,000 units this month. Judging from releases expected of Ford's parts and body suppliers, no time is being lost in capitalizing on the week's loss Chevrolet incurred through Fisher's strike.

There are many in Detroit today who, cannily, will freely wager that Ford's 1934 total production will better Chevrolet's, this notwithstanding a directly opposite showing the first four months this year. Shrewdly, these same prognosticators say a Ford price cut, probably nominally of $5 to $10 a car, may be announced soon, if for nothing more than the psychological effect.

Ford is also reported considering an announcement like this: Ford V-8 motors to be sealed on delivery and guaranteed for 40,000 miles against all adjustments except carburetor and distributor points. If any adjustment whatever should be required, another engine would be substituted.

For many Ford drivers this guarantee would cover four years of service and have the effect of bringing them in at the end of the period as a prospective buyer of a new car. Ford, incidentally, is going in for music in a big way, having retained the Detroit symphony orchestra to play at his Century of Progress exhibit at Chicago this summer.

Chevrolet, on the other hand, ate deeply into its float of 25,000 to 30,000 bodies and parts by the week's layoff at Fisher in Cleveland. Hold-

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ups at the other Chevrolet divisions, such as the gear and axle shop, Ternstedt Mfg. Co., were caused, and lasted even into late last week. Much Detroit opinion concurs that this Chevrolet interruption will be costly, saying that any momentum, once interrupted, is difficult to regain.

THE new Buick—an addition to the regular 1934 models—will be out the latter part of this coming week.

Detroit having heard considerable talk now for three months or more on this smaller Buick, it soon will be able to inspect models, for dealers should be fairly well stocked by later this week or next.

Briefly, the new car is just a small edition of the three present series. By such it disappoints both the antagonists of coil-spring front ends and the proponents of advance streamlining.

This small Buick will center its appeal in price. The sales figure, though undisclosed, has been broadly intimated to be low enough at Flint to deliver anywhere in the United States for less than $1000. But, in addition, the model is remarkable for a more powerful motor and a considerably lightening in body weight.

The series is to be designated as "40", against the present "50", "60", and "70", lines, and although only 2 inches shorter in wheelbase than the "50" series, it is some 500 pounds lighter. Into this lighter chassis and body has been set a 93-horsepower motor, contrasted to the 86-horsepower power plants in the larger series "50".

Series "40" thus will feature a greatly reduced weight to horsepower ratio, figuring down to 34.6 pounds for each horsepower rating. At 117 inches wheelbase, considerable weight has been jettisoned from the small car though outwardly, the new small Buick looks just the same as its larger brothers except it does not have power brakes, the horn is concealed under the hood and there is only one tail-light instead of two.

With price and power its appeal, the former certain to be a lure to many former Buick owners of years gone by who have demoted themselves to smaller cars, there is little doubt the series "40" of Buick may prove a volume-production car. How it wedges in on Olds and Pontiac will be a problem for General Motors.

Chrysler has plans for 80,000 cars this month, but Detroit thinks likely the schedule will be revised downward. Plymouth is turning out close to 10,000 models weekly, which if continued, would account for half of that ambition, but Dodge production is off to around 500 daily and the airflows, DeSoto and Chrysler, have not pierced the 300 mark in daily activity.

Cadillac and LaSalle may make 3000 jobs this month. Studebaker assemblies were off last week to the basis of 1700 weekly. Hudson is down to around 700 daily with two lines instead of three now operating. Graham, scheduling 2350 cars for May, will be under the April showing. Pontiac appears to be ahead slightly on finished cars, but Olds and Buick rates last week were steady. Buick, preparing to stock the field with its "40" series, will show a better rate in May.

Died:

FRANK SAMUEL, 75, president, Frank Samuel & Co. Inc., Philadelphia, identified with the iron and

Frank Samuel

steel industry for 58 years and operating under his own name for 41 years, in a Philadelphia hospital, April 29. About 1873 he became associated with the late Frank P. Howe as Howe & Samuel to operate a small mill at Phillipsburg, Pa. It was the first mill to produce low-phosphorus melting bars to take the place of Swedish iron then used by crucible steel makers. Foreign ores were imported by the firm so that the Norristown blast furnace of Isaac McHose & Son could produce the necessary low-phosphorus pig iron for the Phillipsburg mill. In 1897 Mr. Samuel bought the Tidewater Steel Co. at Chester, Pa., since the Delaware River Steel Co.

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C. R. Gregg, recently associated with Wachs-Gregg & Co., Chicago, machine tool dealer, in that city, April 27. At one time he was identified with the machinery department of Joseph T. Ryerson & Son Inc., Chicago.

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George H. Diehl, 65, machinery manufacturer, at 153 Waverly place, New York, April 30.

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H. C. Shaw, 52, president of Shaw-Perkins Mfg. Co., Pitsburgh, manufacturer of radiators, in Pittsburgh, April 30.

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James O. Callaghan, 77, former manager of the Hamilton, Ont., plant of the Steel Co. of Canada, in Hamilton, April 26. He retired in 1923.

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George P. Nichols, 72, from 1894 until his retirement several years ago a partner in George P. Nichols & Bros., Chicago, manufacturers of railroad machinery, in a Milwaukee hospital, May 1.

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Joshua G. Splane, 62, co-owner of the Detroit Insulated Wire Co. until 1932 and also owner of the Columbia Electric Supply Co., Detroit, in Pittsburgh, May 1. He was also formerly a vice president of the Monongahela Tube Co., Pittsburgh.

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William F. Scherer, organizer of the W. F. Scherer Co., dealer in firebrick and other refractories, Buffalo, in Lancaster, N. Y., April 19. He was connected with the iron and steel industry for 25 years and organized the Scherer company in 1920.

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W. P. Mitchell, 45, vice president of Bliss & Laughlin Inc., Chicago and Buffalo, as a result of an automobile accident in New York state, April 29. He was identified with the steel industry for 27 years. Prior to 1920 he was associated with the Illinois Steel Co. at its South Chicago works and later in the general sales office at Chicago. Joining Bliss & Laughlin Inc. in 1920, he was made vice president in 1930.

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Henry A. Butler, 61, prominently identified with a number of interests in the Mahoning valley, in a Youngstown, O., hospital, April 26. Born in Youngstown, he was the son of the late Joseph G. Butler Jr. He began his business career as paymaster and purchasing agent for the Youngstown Steel Co. and for several years was superintendent of the Shenango Furnace Co., Sharpsville, Pa., later being named assistant to the general superintendent of the Youngstown Sheet & Tube Co. In 1913 he was made order clerk for Sheet & Tube, a position he held until 1918, when he entered war service. He was a member of the American Iron and Steel institute and a director in the Sharon Steel Hoop Co., Industrial Silica Co. and other Youngstown industries.

Industrial Men in the Day's News

F. A. Lorenz Jr., Vice President, American Steel Foundries

Supervising sales and production of steel castings has occupied his attention for many years.

For the past four years he has been general manager of plants in Indiana Harbor and Pittsburgh.

Foundrymen are familiar with his numerous contributions to the literature of steel casting.

F. A. LORENZ JR., who as noted in STEEL for April 9 has been made vice president of American Steel Foundries, Chicago, formerly was assistant vice president in charge of operations and general manager of both the Indiana Harbor, Ind., and the Pittsburgh plants of the company, in charge of sales and production.

Following graduation from the University of Illinois, Urbana, Ill., in 1909 with a degree in mechanical engineering, he became a motive power apprentice in the Chicago shops of the Chicago & North Western railroad.

In 1910 and 1911 he served in various capacities in the plant of the Republic Iron & Steel Co., East Chicago, Ind. He then became associated with American Steel Foundries as manager of sales for the special steel wheel made by that company.

Since that time he has held various posts, including assistant to the fourth vice president in charge of operations and works manager of the Indiana Harbor plant. In 1929 he was named assistant vice president in charge of operations and in 1930 he was appointed general manager of the Indiana Harbor and Pittsburgh works.

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Guy H. Newton has been named works manager for the Graver Tank & Mfg. Corp., Chicago. At one time he was operating manager for Reeves Brothers, Alliance, O., steel fabricators, and later became vice president and general manager of this company's Birmingham, Ala., plant, taken over in 1925 by the Chicago Bridge & Iron Works.

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R. H. Maddocks has been appointed assistant to general sales manager of the Central Iron & Steel Co., Harrisburg, Pa., with his headquarters in the company's New York district sales office, 25 Broadway.

R. S. Maddocks is now associated with the same office as district sales manager.

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George D. Blair Jr. has been reelected president of the Blair Strip Steel Co., New Castle, Pa.

C. Allan Ingals, general sales manager since 1929, has been elected vice president to fill the vacancy caused by the resignation of J. C. Blair. Mr. Ingals also was named a director.

E. N. Fulkerson continues as secretary.

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C. E. Tuttle, president, Rustless Iron Corp. of America, and his assistant, J. K. Remson, will make their headquarters at the company's general offices in Baltimore early in May. They are now in New York.

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Lewis D. McClaren, formerly resident manager of the Indiana Consumers Gas & By-Product Co., Chicago has been appointed manager of foundry and industrial coke department of the Republic Coal & Coke Co., 8 South Michigan avenue, Chicago.

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D. C. McGrew, formerly assistant secretary, has been appointed secretary of the Colorado Fuel & Iron Co., Denver, succeeding J. C. Hamilton, resigned.

Frank Yale, of the secretary's office, has been named head of a new real estate department of the company.

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C. F. Mehler has been appointed accountant (purchasing agent) of the Northern Equipment Co., Erie, Pa., succeeding K. B. Lapsley.

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Ross H. McMaster has been reelected president of the Steel Co. of Canada, Hamilton, Ont. All other former officers, as well as directors, likewise have been re-elected.

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Clyde E. Williams has been named director of Battelle Memorial institute, Coumbus, O., succeeding Dr. H. W. Gillett who will continue as chief technical adviser. Both have been associated with the institute since 1929, Mr. Williams previously as associate director. Dr. Gillett also has been metallurgical supervisor.

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Gunnar Palmgren has been appointed chief engineer of S. K. F. Industries Inc., Philadelphia. He comes from Sweden where he had been similarly connected with the S. K. F. Industries. He succeeds H. E. Brunner, retired. Mr. Palmgren is the inventor and designer of a new ring-type cold strip rolling mill. He also conducted more than 3000 cold rolling pressure tests and set up formulas which now are used widely in the calculations of loads in rolling different types of metals.

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R. B. Mildon has been elected vice president in charge of marketing, engineering, manufacturing and service on products of the South Philadelphia works of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He became associated with the company in 1909 in charge of the gas producer department of the machine works at East Pittsburgh. Recently he has been in charge of the stoker department.

George H. Bucher has been elected president of the Westinghouse Electric International Co., East Pittsburgh. He has been with the organization since 1909, since 1932 vice president and general manager of this Westinghouse export affiliate.

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E. G. Todt, of the E. G. Todt Co., Chicago, was elected president of the American Machinery and Tools insti-

tute, at that organization's annual meeting in Chicago, April 26. Other officers chosen include: Vice president, Rudolph Krasberg, R. Krasberg & Sons Mfg. Co.; treasurer, Craig B. Hazelwood, First National bank; secretary, George R. Tuthill, 40 North Wells street; and directors, E. R. Prout, Teletype Corp.; J. S. Kozacka, Lewis institute; A. C. Wais, Niles Tool Works Co.; J. Gordon Barr, Morse Twist Drill Machine Co.; and F. B. Coyle, International Nickel Co. Inc., New York.

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L. F. Tifft, former director of purchases for the Syracuse Chilled Plow Co., Syracuse, N. Y., has been retired on pension after 32 years with the company. He is succeeded by W. F. Manning.

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R. P. Dodds has resigned as advertising and publicity manager of the Insulite Co., Minneapolis, to become general advertising and sales promotion manager for the Truscon Steel Co., Youngstown, O.

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Carl L. Liebau, for 13 years vice president and general manager of the Decatur Malleable Iron Co., Decatur, Ill., is now with the sales department of the Federal Malleable Co., West Allis, Wis.

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W. Raymond Kuhn has been appointed Cleveland district sales manager for the West Leechburg Steel Co., Pittsburgh, and will be located at the company's new office being opened at 1836 Euclid avenue, Cleveland. He has been with the West Leechburg company 19 years as manager of the Pittsburgh district and previously was New England district manager.

Norman D. Carpenter has been appointed Pittsburgh district sales manager, succeeding Mr. Kuhn. Mr. Carpenter has been with the company 18 years, 14 as traffic manager.

Allan R. Herlehy has been appointed West Leechburg traffic manager, succeeding Mr. Carpenter. Mr. Herlehy has been connected with the company for the past 14 years, having held various positions in the auditing department.

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Arthur H. Smith, formerly vice president of the Railroad Materials Corp., joined the Youngstown Sheet & Tube Co., Youngstown, O., April 16 as special representative of railroad sales in the East. He will make his headquarters in New York, covering the territory east of Youngstown from Maine to Florida.

Mr. Smith has been connected with railroad sales almost continually since 1912, when he joined the Railroad Supply Co., of New York. He left this company in 1917 to join the army, but returned from the war in 1919 and became assistant to the vice president. In 1930 he became vice president of the Railroad Materials Corp. and remained there until his affiliation with Sheet & Tube company.

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N. E. Daub, formerly associated with the Atlantic Foundry Co. and the Adamson Machine Co., Akron, O., is now resident sales representative at Akron for the Massillon Steel Casting Co., Massillon, O.

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Albert S. Low has been appointed vice president and chief engineer of the Austin Co., Cleveland, engineer and builder, succeeding Harry E. Stitt as chief engineer, the latter to continue as consulting engineer. Mr. Low has been with Austin Co. for

Albert S. Low

21 years, the last 12 in charge of the central district as regional vice president with headquarters in Chicago.

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Collis Johnson, formerly manager of the Howard-Cooper Corp., Seattle, has been elected vice president and general manager of the Willamette-Ersted Co., Portland, Oreg., heavy steel fabricator.

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L. A. Shea, hitherto identified with the main office in charge of the electrical department of Hevi Duty Electric Co., Milwaukee, has been appointed district representative for the company in Ohio, with offices at 5005 Euclid avenue, Cleveland. He will have charge of the company's service and sales agency on electric heat treating furnaces.

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R. C. Ingersoll, president of the Ingersoll Steel & Disc Co., Chicago, division of the Borg-Warner Corp., sailed April 29 for a six-week business trip to France, Germany and England. He will visit several continental and British steel companies which have shown interest in obtaining license to make stainless-clad steel, a major product of the Ingersoll company.

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William P. Witherow, president, Steel Products Co., Pittsburgh, has been nominated for director of the chamber of commerce of the United States to represent the second district, comprising New York, New Jersey, Pennsylvania and Delaware.

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Lawrence K. Cecil, 1531 East Thirty-fifth street, Tulsa, Okla., has been appointed sales representative in Oklahoma and Texas for the Coppus Engineering Corp., Worcester, Mass., manufacturer and engineer handling blowers, steam turbines and air filters.

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T. J. Dillon, of New York, has been elected president and general manager of the Standard Steel Construction Co., Welland, Ont. Other officers include: Vice president, F. L. Haviland; and secretary-treasurer, J. J. Breen.

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James Playfair has been elected chairman of the board of the Hamilton Bridge Co., Hamilton, Ont. Other officers named include: President and managing director, W. B. Champ; vice president, F. M. Ross; secretary, F. G. Wilson; and treasurer, F. J. Williams.

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Edgar N. Dollin, formerly president of the Allied Die Casting and Acme Die Casting corporations, has been appointed manager of the die casting division of American Type Founders, Jersey City, N. J., and will direct expansion of this division to handle commercial die casting work. Active in the industry since 1912, Mr. Dollin at one time was general manager of the Precision Casting Co., Cleveland and Syracuse, N. Y.

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F. A. Emmons Jr. has been appointed representative for a new section of Chicago territory for Foote Bros. Gear & Machine Co., Chicago.

A. C. Hanson, of New Buffalo, Mich., has been named representative for the northern half of Indiana, with the exception of Lake county.

J. H. Nicholson, Omaha, Nebr., is now sales representative for all of Nebraska and the two western lines of counties in Iowa.

John M. Davis, Denver, replaces Urquhart Service Co. as sales representative in Colorado and Wyoming.

S. D. Calloway, Kansas City, Mo., is the new Foote Bros. representative in Kansas, succeeding the Noelling Steel Sales Co.

EDITORIAL

Industry Soon Will Have To Mend Market Fences

PROBLEMS pertaining to the relations of government and industry in the past year have claimed so much undivided attention from industrial executives that it has been difficult, if not impossible, for many of them to keep track of what has been going on in markets which their companies serve.

From the advent of NRA, codes and other matters involved in the relations between government and industry or in the relations between companies within industrial groups have taken precedence over the ordinary problems of management. Merchandising and sales, finance, production, and other essentials of successful company management have been given only such attention as could be spared from the demands of Washington.

Sooner or later this condition will change, and chief executives again will devote the major part of their time and effort to the affairs of their own companies. Mark well the time when this occurs, because it will be the signal that uncertainty over government policies affecting industry has passed. Also the return of presidents and vice presidents to their regular jobs probably will coincide with the release of the accumulated reservoir of capital and credit, now held back by fear.

Consumer, Noting Improvements in Certain Products, Will Demand Them in Other Lines

When this time comes—and it may not be far off—the industrial world will be amazed at the vast job of reconstruction which will then confront it. At that time, the surprising degree to which developments of the depression period have made obsolete old ideas, practices, methods and materials will be revealed spectacularly.

Most of these developments begin with the consumer, and already his behavior indicates that he will not be satisfied with many articles which he accepted willingly only five years ago. His taste has been whetted by many new materials and products introduced or refined during the recent lean years. In spite of the lack of profits in industry, marked improvements in metallurgy, engineering and design have resulted in better materials and more satisfactory ways of conducting fabricating, finishing and manufacturing operations. The results of this progress have been revealed in certain products. The consumer has recognized their good points, and he demands that they be incorporated in other equipment to which they are applicable.

A good illustration of this influence is found in the "Zephyr," the stainless steel, streamline, motor train of the Burlington, construction of which is discussed on page 30 of this issue. The railroad officials, interpreting public taste, felt that the potential passenger will ride on rails if the equipment will afford him the service and comfort obtainable in automobile transportation. Therefore, they discarded tradition in car building and designed a train along novel lines.

Burlington Train Shows How New Ideas Can Change Alignment of Industrial Units

It behooves every producer of materials, every fabricator of metal and every manufacturer to ponder the implications of what is involved in the "Zephyr," which is typical of what is transpiring in many other fields of activity.

First, the Burlington did not award the contract for its new train to an established railroad car builder; it gave it to a company engaged in manufacturing automobile bodies.

Second, it bought its motive power from a diesel engine builder; not from a locomotive builder.

Third, instead of the traditional heavy plates and shapes of carbon steel for the car bodies, stainless steel in thin, flat-rolled form was employed.

Fourth, the stainless steel structural members and the stainless steel sheathing were fabricated by shot welding; riveting—the long accepted method—was used only on articulation castings.

Fifth, the engine bed and crankcase of the engine, which in conventional design are cast, in the "Zephyr" are of rolled alloy steel, fabricated by arc welding.

The fact that the Burlington ignored the established car and locomotive builders and that it did not choose traditional methods and materials does not mean that the companies and products thus scorned are threatened with a loss of their accustomed markets in the future. It does mean, however, that in the reconstruction period new alignments in industry will be required to meet the new demands of the consumer. It means that markets, seemingly well established, may prove to be unstable. The situation calls for alertness on the part of every company.

This, in brief, is typical of the problems which will confront executives when they can safely shift their eyes from the Washington scene. They, like politicians, will do well to keep up their competitive fences.

THE BUSINESS TREND

Financial Skies for Industry Are Clearing Slightly

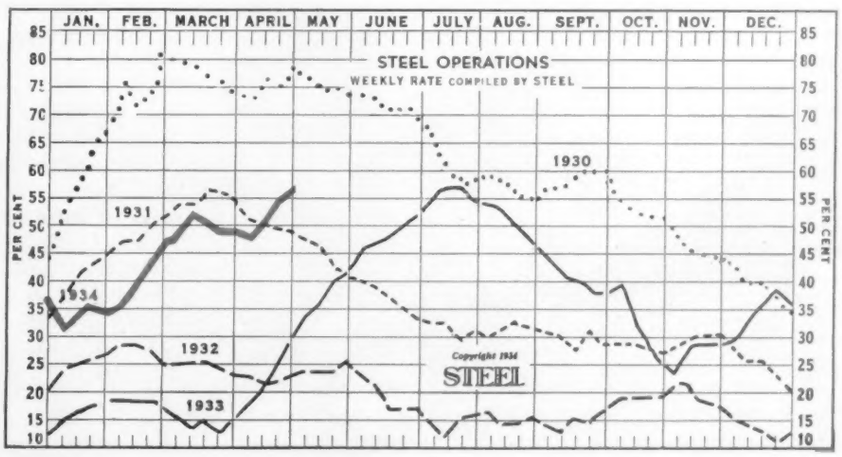
ONE of the encouraging factors in business today is the better tone in finance. While the behavior of the stock market has been erratic, the bond market has been gaining strength for some time. Borrowing has increased sharply, indicating an improved situation in public credit. The issuing of $3,000,000 of new stock by Otis & Co. for the Glenn L. Martin Aircraft Co.—said to be the first important flotation of new private money for industry since the securities act of 1933 was passed—may be a sign that the dam against investment in industry is weakening.

This view is supported by under-cover activities in industry itself. Considerably more rehabilitation of plant and equipment is taking place than is generally realized. Only a strengthening of policy in Washington—a mere indication that the administration will stick to a given program—is required to set in motion a tremendous activity in reconstruction.

Much has been written of an anticipated recession of industrial activity in May. Thus far no signs of it are apparent in the iron, steel and metalworking industry. When the records for April are available, they will show a continuation of the March improvement, all along the line. Strikes, which disturbed operations in the automobile industry during recent weeks, are settled, temporarily at least. Their effect has been merely to set back certain assemblies somewhat.

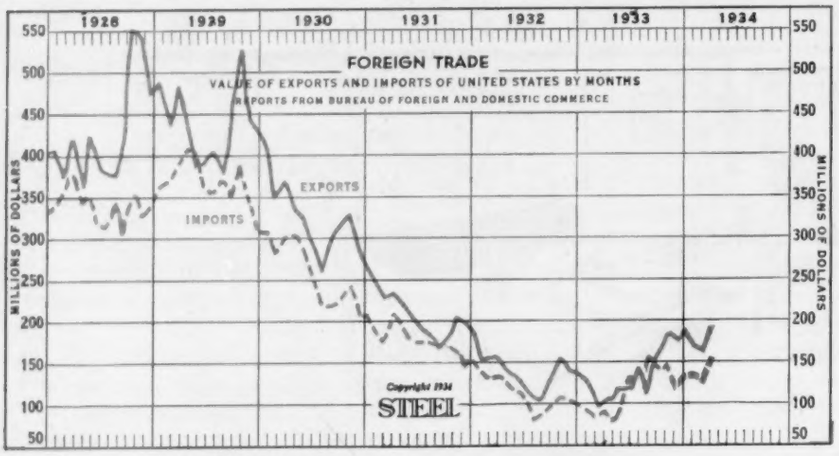
Trend in Industrial Activity Points To Continued Gains During Month of May

Weekly business reports continue favorable in the main. Freight car loadings again are tending upward, after recessions due to coal mine labor trouble. Electric power output in the week ending April 28 was off from the previous week by a slight margin, but remained almost 17 per cent ahead of the comparable 1933 week. Steelmaking operations are practically even with the highest point of 1933, attained last July. Pig iron output has mounted steadily, with promise of more stacks going in during May.



1934	
April 28	57
April 21	55
April 14	51
April 7	48

1933	
April 29	25
April 22	20.5
April 15	17.5
April 8	15.5



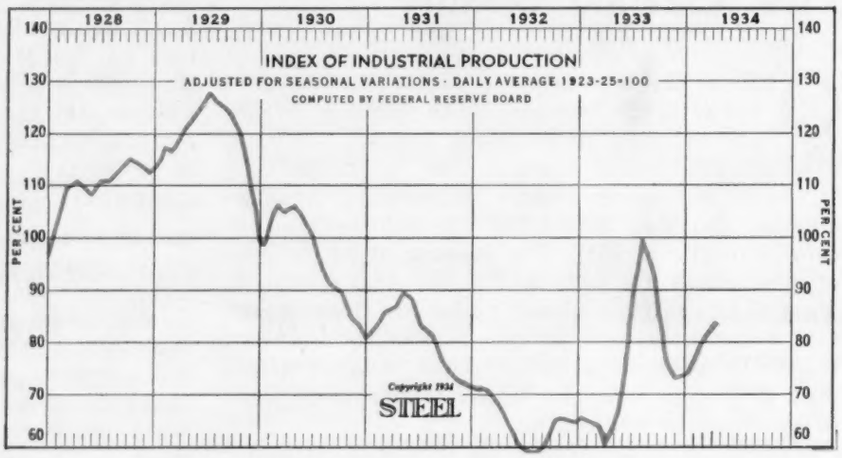
Exports		Imports	
March, 1934 ..	$190,000,000	March, 1934 ..	$158,000,000
Feb. 1934	162,805,000	Feb. 1934	132,656,000
March, 1933 ..	108,015,000	March, 1933 ..	94,860,000

March Foreign Trade Advances Sharply

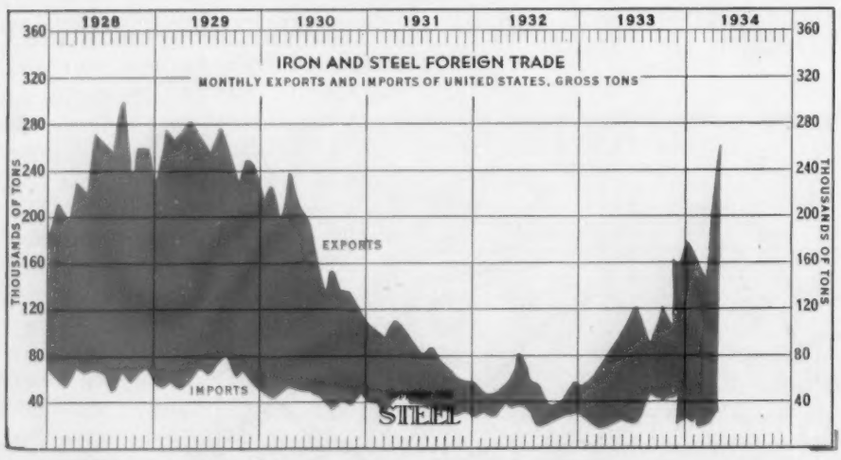
The foreign trade figures for March, issued by the department of commerce, show a considerable advance over any other month this year. The value of merchandise exported during the third month was $190,000,000 as compared with $162,805,000 in February and only $108,015,000 in March, 1933. Imports in March at $158,000,000 are the highest for any month since October, 1931 and compare with $132,656,000 in February. Imports during March, a year ago, were valued at $94,860,000.

Industrial Production Index Continues Upward

Industrial production as reported by the Federal Reserve board, advanced 3 points in March. The monthly production index, adjusted for seasonal variation, was 84. This compares with 81 in February and 59 in March a year ago. In the manufacturing group, the iron and steel production index advanced 3 points to 67 and compares with 22 in March, 1933. Increases also were reported for textiles and automobile, the latter advancing 7 points to 80.



	Per Cent
March, 1934	84
February, 1934	81
March, 1933	59



Exports	Tons	Imports	Tons
March, 1934	261,269	March, 1934	38,393
February, 1934	151,184	February, 1934	25,407
March, 1933	80,567	March, 1933	22,114

March Steel Exports Highest Since July, 1929

Iron and steel exports of the United States in March totaled 261,269 gross tons, the highest record of shipments of any month since July, 1929 according to the iron and steel division, department of commerce. This represents a gain of 110,085 tons over the preceding month and compares with 80,567 tons exported during March 1933. Imports were 38,393 tons in March against 25,407 tons in February and 22,114 tons during the third month a year ago.

EXTRUDED STEEL FORGINGS—THEIR PRODUCTION, USE

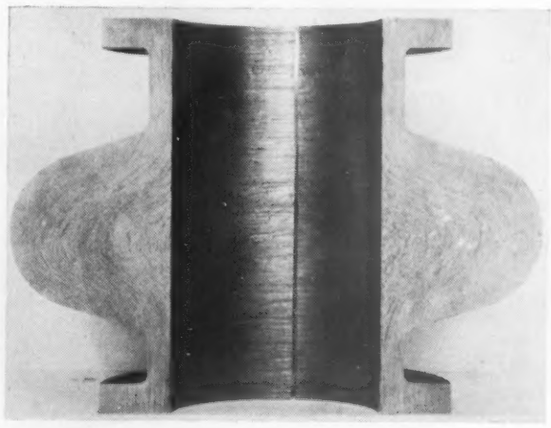
BY EDWIN F. CONE

ONE of the vertical hydraulic piercing presses for making extruded forgings. A heated slug or billet ready to be processed and its appearance just after piercing are shown, disclosing the open end

AN IMPORTANT outgrowth of conditions following the World war was the conversion of plants and equipment, active on munitions and war materials in the 1914-18 period, into units turning out products for industrial applications. In many cases, this necessary reversal of applied energy resulted not only in a return to products made before the war, but in the development of others new in their fundamental substance, process of manufacture, and applications.

This was especially true in the steel industry. In many of its various phases of activity early in 1919 the high-pressure production of steel, only for destruction, suddenly had to cease and a new outlet for the metal had to be created.

A striking illustration of this is found in one of the departments of the Bethlehem Steel Co., Bethlehem, Pa., where extruded forgings are made on a large scale and for a wide variety of uses. Products of this specialty forge department, as it is called, are sold today for at least six major industrial uses. Their production is an outgrowth of the processes used in making shells and projectiles. Actually, these comparatively new products are made by piercing, drawing, piercing and drawing, upsetting and piercing, or extruding. In general, they might be designated as pierced, drawn or extruded forgings. In most of the operations, extrusion is a factor in that the dies are semi-enclosed, or open at the top, where the excess metal has an outlet.



Hub forging sectioned and etched to show smooth flow lines resulting from unusual care in forging

Stock used in making extruded forgings comprises small billets, blooms or bars of steel of the composition suited to the use for which the forgings are intended. Each piece or slug, before processing, is nicked and broken to length by the oxyacetylene torch and a gag press. Careful inspection of the fractures insures the rejection of unsound or defective material. Both plain carbon and alloy steels are used; in fact, any composition which can be forged. Among some of the steels incorporated in these forgings may be mentioned chrome-nickel, chrome-molybdenum, nickel-chrome - molybdenum, corrosion - resisting steels, the 4 to 6 per cent chromium — 0.50 per cent molybdenum and the medium manganese compositions, as well as

the plain carbon. Before forging, the material is preheated in gas-fired furnaces, final temperatures ranging from 2100 to 2300 degrees Fahr. When alloy steels are used, the preheating is carried out more slowly than in the case of plain carbon steels.

The heated material is dropped into the die and pressed to fill the die. The punch is then brought into position and lowered by hydraulic pressure to pierce the hot metal. The illustration at the top of Page 25 shows this operation.

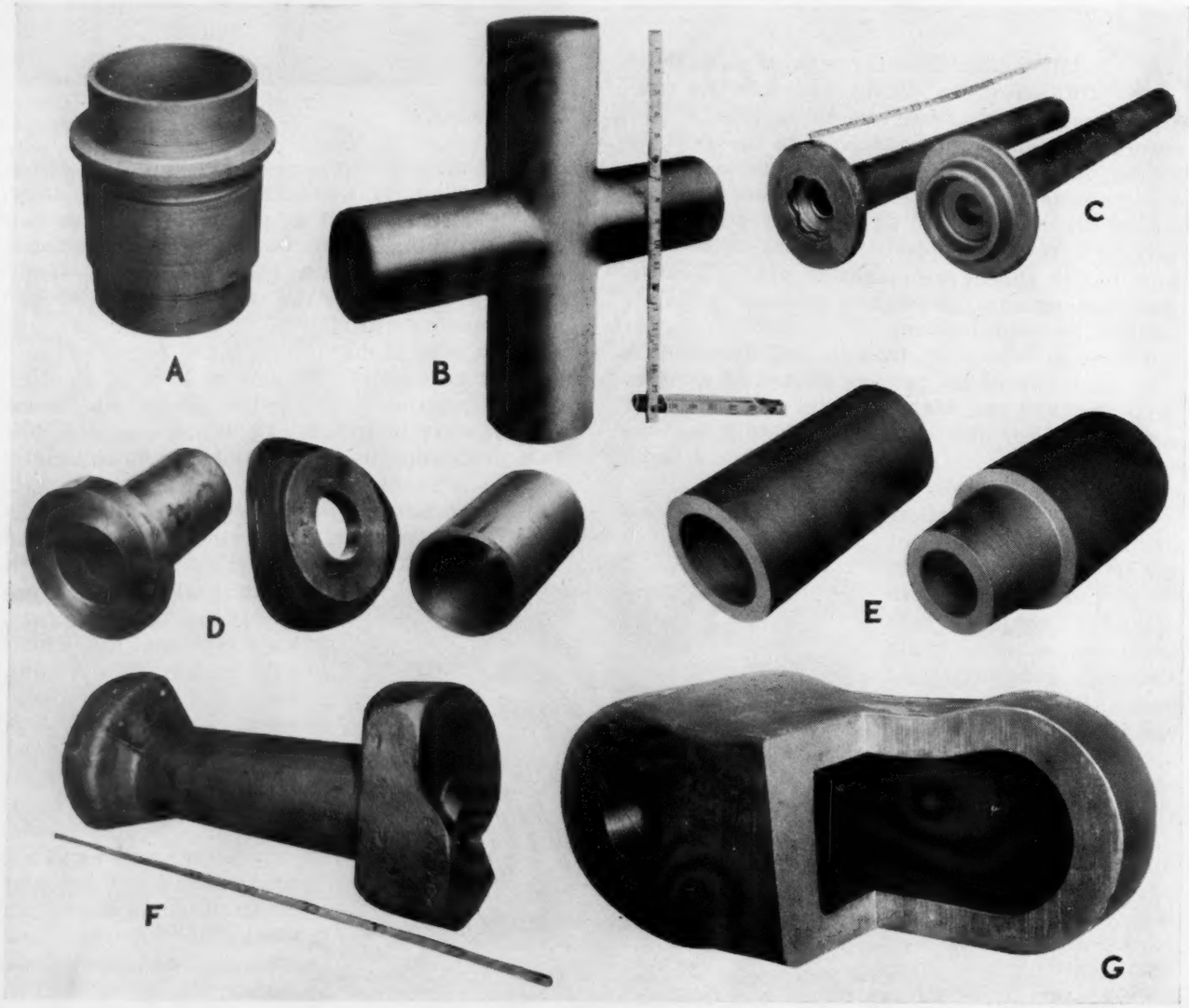
The forging then is stripped from the punch and removed from the die. Depending on the product to be made, the punched piece then may be slipped over a long mandrel and pushed by means of the hydraulic cylinder of a horizontal draw bench through a series of drawing rings. By this process, varied in its application, the wall of the cylinder becomes increasingly thinner while the length increases. At the end of the stroke, the tube is completed and stripped from the mandrel.

It is the general practice to heat treat the product at this stage of the processing by annealing at suitable temperatures. When necessary, special heat treatment is applied. This is sometimes done after rough machining. For example, airplane cylinder sleeves, which constitute a large proportion of the output of this department, are oil quenched and drawn to a specified hardness after rough machining to within 1/16-inch of the specified finish dimensions. Most extruded products are finished in the annealed condition and some are subjected to further heat treatment by the purchaser.

The department has a large assortment of vertical hydraulic piercing presses ranging from 200 to 1500 tons capacity, and hydraulic draw benches with capacities ranging from 75 to 300 tons. Vital factors in the successful production of these forgings are the dies, which are generally of cupola gray iron, high in graphite. They are water cooled and usually circular in form. As stated before, they are open at the top. The life of the dies ranges from 100 pieces up to several thousand, depending upon the intricacy of the forging and the thickness of its extruded wall; that is, the thicker the wall, the longer the life of the die.

The department has a large machine shop for machining any forgings so ordered, together with a heat treating department so that the unit includes forging, heat treating

TYPICAL EXAMPLES OF SPECIALTY FORGINGS: A—*Rough turned cylinder sleeve for airplane engine.* B—*A 6-inch pipe cross forging as it comes from the dies, an excellent example of pure extrusion.* C—*A trunk piston for a locomotive booster, partially machined. Note upset head.* D—*Three extruded forgings of corrosion-resisting steel. (Left) A steam trap body, (center) a saddle flange, and (right) a pump sleeve.* E—*A 6-inch pin and box end tool joint after machining.* F—*A pinion crankshaft for auxiliary locomotive, difficult to forge on account of large size.* G—*A return bend forging sectioned to show the interior*



These views give some idea as to the range of products made in the specialty forge department

and machining or every necessity except steelmaking. Steel, of course, is furnished by one of the rolling mills of the company.

Of major importance are directional flow lines set up in extruded forgings. This feature is clearly shown in two of the accompanying illustrations. Reasons for the importance of these flow lines are evident to any one conversant with the strength of materials. The flow lines in the metal, as set up by this process, are such that the highest combination of tensile strength, elasticity and ductility are developed in the areas subjected to the highest service stresses. It is established that such products are superior in physical properties to forgings in which flow lines are not controlled.

Uses Have Been Expanding

A feature of this development of the past 15 years is the gradual perfection of a variety of extruded forgings and their wide application to industrial uses. Illustrations on these pages furnish adequate and eloquent demonstration of this fact. Among the major products may be mentioned valves and tool joints for the oil industry, high-pressure fittings for boilers, cylinder sleeves for airplanes, trunk pistons for locomotive boosters, hub forgings and brake drums for trucks, short lengths of high grade tubing for bearing metal races, certain parts for electrical apparatus and the like.

Particular attention may be directed to the illustration (*B* on Page 26) of a 6-inch pipe cross forging as it comes from the dies. It is a first-class example of pure extrusion. A forging with an upset head is shown by the illustration (*C*) of a trunk piston on a locomotive booster. The 6-inch pin and box-end tool joint (*E*) is an example of a product as made by simple piercing. The diversity of products possible is emphasized by the illustration (*F*) of a pinion crankshaft for an auxiliary locomotive. The shape and large size render this an exceedingly difficult forging to produce. An unusual product is a return bend forging (*G*) sectioned to show the interior.

Based on experience gained thus far, there are great possibilities in other products made as extruded forgings.

150-Ton Gantry Crane Is Built by Arc Welding

An unusually large gantry crane, said to be the first of this type to be built by arc welding, recently was placed in operation by the West Michigan Dock & Market Corp., Muskegon, Mich. A few bolts were used for erection purposes, but the complete structure is essentially of arc welded steel.

The crane weighs approximately 150 tons and has a boom 96 feet long, which carries a 55-inch lifting magnet or a clam shell dipper. When the boom is in a vertical position, the height of the lift is approximately 123 feet. The unit operates on four swivel trucks, thus adapting it to curved as well as straight tracks. Rails are spaced 20 feet apart.

Shaw-Box Crane & Hoist Co. Inc., Muskegon, Mich., was the builder of the crane, using equipment manufactured by Lincoln Electric Co., Cleveland.

Develops Plastic Insulating Refractory for Furnace

Said to be particularly adaptable for use in intermittent furnaces where actual operating temperatures do not exceed 2500 degrees Fahr., a new plastic insulating refractory has been developed by the Chicago Fire Brick Co., 1467 Elston avenue, Chicago, to be marketed under the trade name PIRE. Insulating properties are claimed to reflect the heat, giving a flash heat to furnace walls in a short time and conserving on fuel and labor in preheating.

The material is not used to back up regular firebrick, but is used in place of the latter, having the reputed faculty of being able to stand up under flame impingement. Due to its porous nature, it is not recommended for use where in contact with molten metals, corrosive chemical fumes or highly abrasive materials, unless protected by a refractory coating. Monolithic character of the new material retards heat loss by leakage.

Half section of a 1½-inch high-pressure valve body, hot etched to show flow lines produced by forging

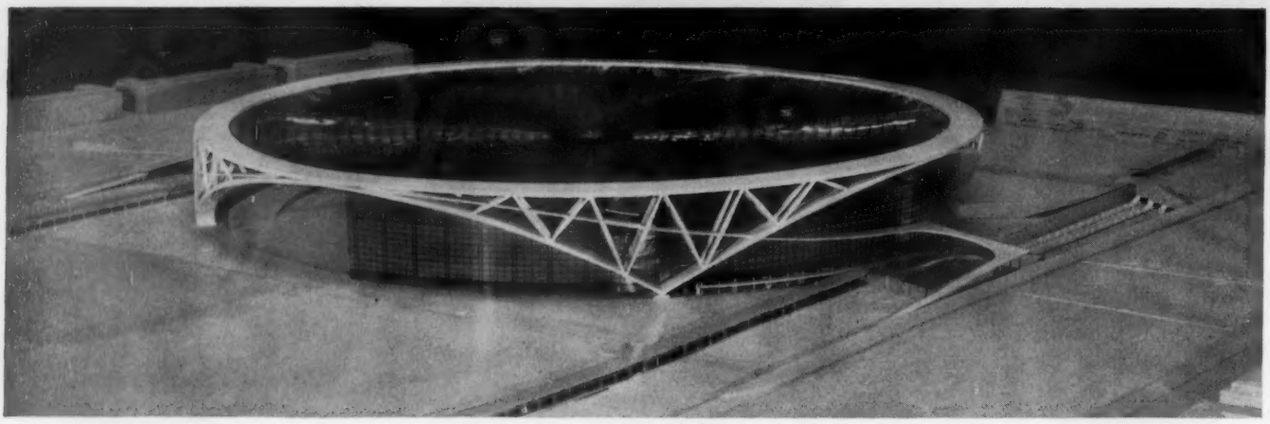


Fig. 1—Architect's conception of proposed circular exposition hall involving 63,000 tons of steel

Propose Unusual Steel Exposition Buildings

BY LEON JAUDOIN
Ingenieur Civil des Mines

IN AUGUST, 1933, the Office Technique d'Utilisation de l'Acier, the French bureau which studies the possibilities of using steel, organized a competition having for its object plans for the erection of a new exhibition hall. The various schemes were submitted to a jury in January this year, and the results of the competition were announced on March 22.

In accordance with the conditions of the competition, an exhibition building had to be planned which could include all types of exhibits. The hall was to cover a rectangular area of 29.69 acres, without any intermediary support. The smallest side of the rectangle was not to be less than 250 meters (820 feet). No conditions were imposed in regard to the various annexes to the main building. The structure was to be made of steel, with horizontal roof and horizontal steel beam.

Many Designs Submitted

Thirteen schemes were submitted by leading French contracting firms, each of which collaborated for the purpose with one or several well-known architects. In most of the schemes an area of 250 x 500 meters (820 x 1640 feet) was provided for, and the beams had a length of 250 meters (820 feet), being calculated to bear a stress of 18 kilograms per square millimeter (25,602 pounds per square inch) and being rolled from steel with a tensile strength of 52 to 55 kilograms per square millimeter (73,961 to 78,228 pounds per square inch).

Generally speaking, these schemes are characterized by what might be termed "steel architecture" the only material used being steel and glass. The solid parts of the roofs and frontages were to be made of semi-stainless steel sheets in large panels, and a variety of methods enabling these panels to expand and contract freely was noted.

The first prize was awarded to Messrs. Tournon and Chappey, associated with the firm of Ponts et Travaux en Fer, for a hall with a system of beams supported at each extremity by columns 250 meters (820 feet) apart.

The first second prize was awarded to Mr. Expert, associated with the firm of Schneider, for a hall having beams 250 feet long, the transverse section of the hall being stepped.

The second second prize was awarded to Messrs. Fournier, associated with the firm of Paindavoine, and with Mr. Douniaux, engineer. The plan provided for a square, 350 x 350 meters (1148 feet square); two annexes, one in front and one behind, were added to this square, each annex being 75 meters (246 feet) wide. The design is illustrated in Fig. 4. In this scheme the roof is supported in its center by two cantilever beams, each 350 meters (1148 feet), supported at each ex-

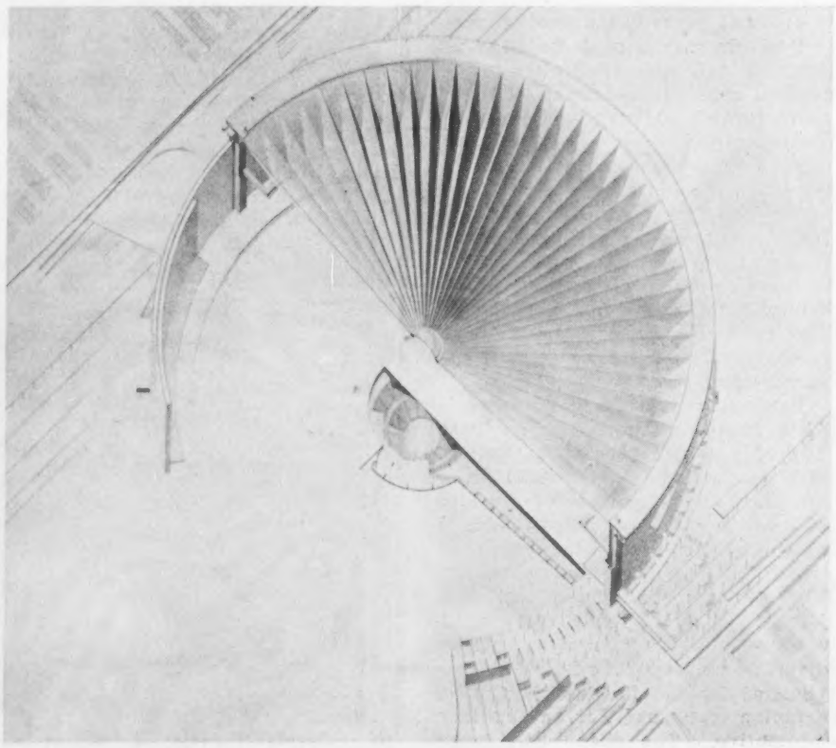


Fig. 2—Another sketch, showing wall and roof design

Fig. 3—Elevation of circular hall, showing how roof is suspended from outer steel band

tremity by columns which themselves support transverse cantilever beams. The engineers who planned this latter scheme and who have already built, in 1933, the Lille exhibition hall, the frame of which was photographically reproduced on the first page of the European section of this year's annual issue of STEEL, conceived a number of happy solutions to solve the problem of expansion and contraction in all directions.

Possibly the most daring scheme in the competition was submitted by Messrs. Baudouin and Lotz, architects, associated with the firm of Paindavoine and with Messrs. Douniaux and Bodiansky, engineers. This scheme was not considered for a prize, because it does not answer to the condition that the area of the hall was to be rectangular, since in this case the design of the hall submitted is circular, as shown in Figs. 1, 2 and 3.

Assembly Under Tension

In the solution proposed by Baudouin and Lotz, the frame is conceived as a kind of inverted dome in which a compressed assembly is replaced by an assembly under tension, which is equilibrated by a belt which is under compression and which is supported by four double consoles or chairs, similar to springs, which can be seen in Fig. 1. The diameter of the circular hall is 500 meters (1640 feet).

The belt is absolutely indeformable and can support high compression stresses; it is, therefore, possible to apply to it considerable efforts, and, consequently, the deflection of the suspended construction is small. Steel cables having a section of about 74.4 square millimeters (0.115 square inch) are fixed round the belt at a distance of 18 meters (59 feet) and support all the glazing. The cables are fixed at their center on a ring made of high tensile steel. The whole of this roofing would weigh about 20,300 metric tons.

The exterior belt is planned to be used as a track for automobiles, and its weight would be 17,200 metric tons. The entire structure must be at a reasonable height, which has been fixed at 51 meters (167 feet) above ground level, for aesthetic purposes. To support the structure, several solutions were possible. A simple circular portico with vertical columns would be sufficient, but would not afford sufficient space. On the other hand, vertical beams erected at four points would have necessitated too great a height. However, considerable lightness is effected by providing for four elliptic arcs, running from four points diametrically opposed, two by two, and running down to the ground. These arcs are constituted by composite beams made of welded semi-stainless steel, the steel proposed containing a certain percentage of chromium and copper. Each of these elliptic arcs would weigh 4360 tons, or 14,600 tons for the four, and the supports of these arcs would necessitate a steel tonnage of 1820.

The system of doors must be so conceived that the two frontages, east and west, can be completely open, while the north and south frontages would be permanently closed, and these closed frontages would serve to house the rolling vertical doors which are provided for the openings. Whether these vertical sections are fixed or mobile, they are constituted by large vertical frames, completely glazed. The doors would be operated by electric motors having a total power of 2000 kilowatts.

A summary of the tonnage of steel required for the construction of this circular hall is as follows:

	Tons
Central ring of the dais	1,580
Suspension of cables	8,350
Articulations of the dais	2,300
Framework, small sections, gutters, etc.	8,070
Total weight of the roofing	20,300
Exterior belt	17,200
Elliptic arcs	14,000
Support for the arcs	1,820
Fixed walls	4,880
Rolling doors	5,230
	43,430
Total weight of steel for the building	63,730

Will Install 4-High Mill

Continental Can Co. Inc. has acquired rights from the Cold Metal Process Co., Youngstown, O., to purchase and operate the Steckel-type single stand reversing hot and cold mills at its subsidiary plant, the Standard Tin Plate Co., Canonsburg, Pa. Orders for equipment are expected to be placed momentarily.

Work on the Steckel-type hot mill at the Hamilton, Ont., plant of the Dominion Foundries & Steel Ltd., which was halted last year because of business conditions, now is proceeding actively. The necessary electrical equipment for the installation has been placed with the General Electric Co., Schenectady, N. Y.

Fig. 4—A perspective view of the proposed design of a rectangular hall, which took second prize

The Burlington "Zephyr" passing the station at Weston, N. J., at 100 miles per hour on its trial run

—Acme Photo

Methods and Materials Play Important Role in New Train

SELDOM have the resources of the American iron, steel and metalworking industry been utilized to better advantage in noteworthy engineering accomplishment than in the development and construction of the Chicago, Burlington & Quincy railroad's new stainless steel, streamline, motor train.

Appropriately called the "Zephyr," this train embodies many radical departures from traditional design and construction, and in almost every case the change from the old to the new was made possible by the application of recently developed materials and methods.

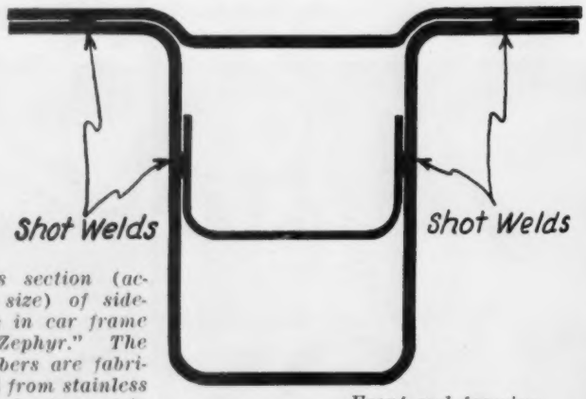
Among the distinctive features of the Zephyr are the following:

1. Built of stainless steel, fabricated by shot welding.
2. Articulated trucks, permitting the three-car train to be supported on four trucks instead of six.
3. Streamlined, reducing wind resistance.
4. Driven by a diesel engine, with arc welded bed and crankcase of alloy steel, and with many engine parts of alloy steel, overall engine weight is only 22 pounds per horsepower.
5. All truck journals equipped with tapered roller bearings.

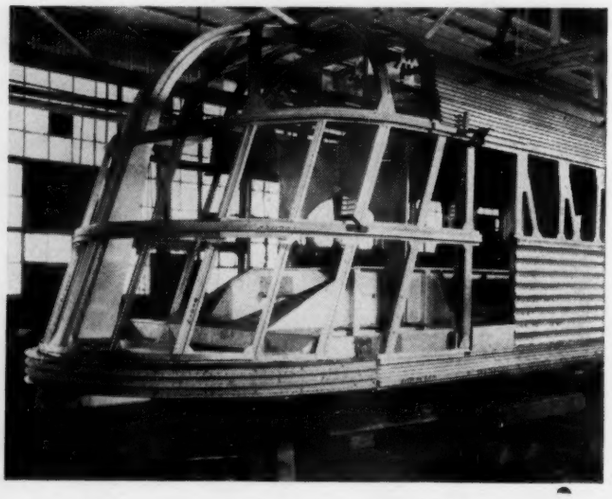
The train was built by the Edward G. Budd Mfg. Co., Philadelphia. It consists of three car bodies mounted on four trucks, is 196 feet long and weighs about 195,000 pounds. From front to rear the compartments in the train are as follows: Operator's cab, engine compartment, railway post office, mail storage room, baggage and express compartment, buffet-grill, passenger compartment (seats for 20), passenger compartment (seats for 40), lavatories, and observation lounge (seats for 12).

Structurally, one of the most interesting features of the train is the design of the car bodies. In ordinary passenger cars the underframe is the principal load carrying member; in the cars of the Zephyr the entire frame of the car body carries the load. The side frames are really Pratt trusses.

Instead of sideposts and other frame members of carbon structural steel as used in conventional design, the frames of the Zephyr cars are of built-up sections of 18 per cent chromium and 8 per cent nickel steel. An idea of the weight economy of this construction can be gained from the accompanying illustration showing the actual size of one of the 46 side-posts. Three pieces of flat rolled 18-8 stainless steel are bent and shot welded at four points as shown. The



Cross section (actual size) of sideposts in car frame of "Zephyr." The members are fabricated from stainless steel sheets or strip and shot-welded at four points, as shown. The sideposts weigh only 24 ounces per lineal foot



Front end framing, showing welded engine bed of cromansil and side wall truss construction of built-up sections of stainless steel

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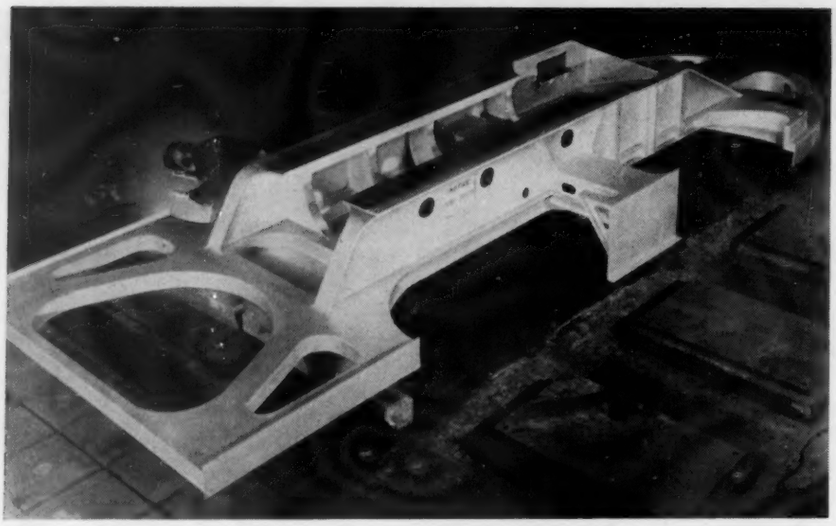


Weighing only 3 tons and supporting load of 30 tons, this engine bed for the Burlington railroad's new streamlined train is of welded chromium-manganese-silicon steel

resultant member weighs only 20 ounces per lineal foot. The stainless steel employed for the frame has a minimum tensile strength of 150,000 pounds per square inch and an elastic limit of 120,000 pounds per square inch. The shot weld process, developed and patented by the Edward G. Budd Mfg. Co., was described in detail in the June 13, 1932, issue of STEEL. Its application to the Zephyr job was discussed in an article by Edward G. Budd in the April 9, 1934, issue of STEEL.

The floor structure of each car consists of 11 longitudinal stringers, to which are fastened transverse supports built into the car frame. This forms a horizontal girder which transmits end thrust to the Pratt truss structure of the side frames. The floor itself is of corrugated stainless steel sheets which are welded to the longitudinal stringers.

Roof of Stainless Steel

The roof structure is a series of small bridge girders of stainless steel, all laced together to afford a compression unit for the entire car. The exterior covering is of stainless steel sheets with 7/16-inch corrugations on a pitch of 1½ inches, except for the roof at the rear end of the third car and the roof over the engine room and operator's cab, where uncorrugated sheets are employed.

Fluted stainless sheets, 0.02 inch in thickness, are used for side sheathing up to the window level, except that flat sheets are used at front and rear. The deadlight panels, above the fluted sheathing, are of Armorply — a structural metal-covered plywood with a 3-ply basswood core, a backing of 2-ounce electrolytic sheet copper and a facing of 0.0156-inch sheet stainless steel. The panels are ¼-inch thick, and the stainless sheets are turned on all edges and soldered to hermetically seal the panels. Some of these panels were the largest ever made with 18-8 steel, utilizing sheets 20 feet long. The panels weigh 1.394 pounds per square foot.

Stainless steel was furnished by Allegheny Steel Co., American Sheet & Tin Plate Co., American Steel & Wire Co., Republic Steel Corp. and Superior Steel Co. The Armorply panels are the product of U. S. Plywood Co., New York. The window sash, of stainless steel, were manufactured by the O. M. Edwards Co. Inc., Syracuse, N. Y. Tuttle & Baily, New Britain, Conn., made the stainless steel engine cooling grille.

Next in point of interest to the novel use of stainless sheet steel, is the power plant of the Zephyr. The prime mover is a 2-cycle diesel engine built by the Winton Engine Corp., subsidiary of the General Motors Corp. It has eight cylinders, 8-inch bore x 10-inch stroke, which develop 600 brake-horsepower at 750 revolutions per minute.

Careful selection of materials and methods enabled the Winton engineers to reduce the weight of the engine to 22 pounds per horsepower. This was accomplished to a large degree through the use of alloy steel and arc welding.

The engine bed, or chassis of the motor power unit, is of arc welded construction, fabricated from chromium-manganese-silicon steel. This application is believed to be the first instance of the use of a welded steel engine bed on a motive power unit for main line railway service.

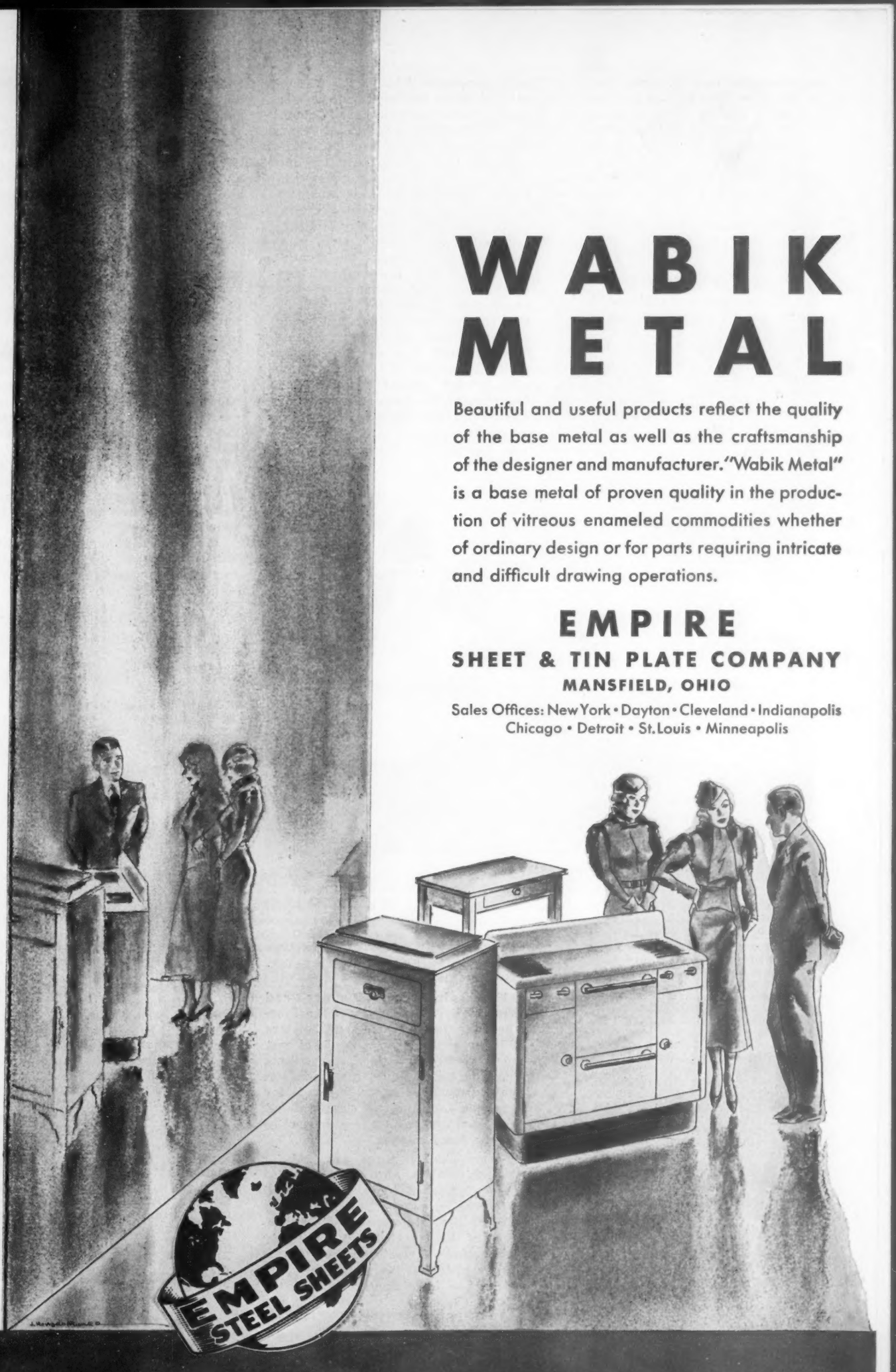
Design of the engine bed was developed by Lukenweld Inc., division of Lukens Steel Co., Coatesville, Pa., in co-operation with the Edward G. Budd Mfg. Co., and the railroad company. In developing the design (see STEEL, April 9, p. 23) particular attention was given to the elimination of rectilinear elements which would involve undesirable concentrations of stress. Angles, channels and "picture-frame" correlations were avoided because they would result in severe changes in contour which, in turn, would be incipient points of failure.

Stress Concentrations Avoided

It will be noted from the accompanying illustration that the engine bed design utilizes moderate changes in contour, not only to avoid concentrations of stress but also to introduce a high degree of redundancy. The mutual interaction of adjacent members is an important element in the functioning of the structure as a single unit rather than as a connected assembly of individual units.

The engine bed is 25 feet 3½ inches long, 8 feet 8 inches wide, and fabricated from 204 separate 5/16-inch plates. It has a high ratio of load-carrying capacity to weight of metal employed, since it weighs only 6060 pounds and supports the

Welded crankcase for the Winton engine of the "Zephyr." The use of cromansil steel, fabricated by arc welding, aided in minimizing weight. The completed engine weighs only 22 pounds per horsepower



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60,000-pound load. It forms the bed of the front half of the first car of the train, and is joined at the rear to the stainless steel structure forming the balance of the car.

In addition to the engine bed, the crankcase of the diesel engine powering the train is also of welded construction, fabricated by Lukenweld from chrome-manganese-silicon steel (STEEL, Aug. 28, 1933, p. 31; Sept. 11, p. 25).

Alloy Steels Effect Lightness

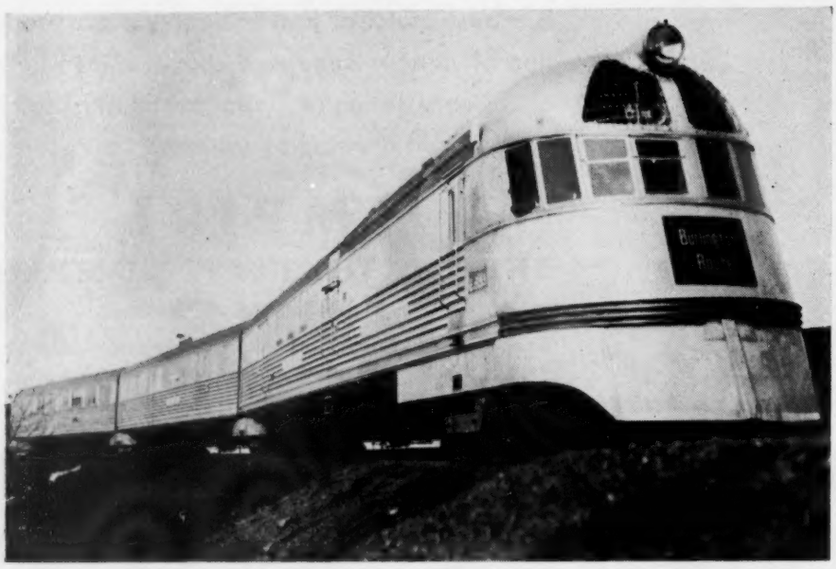
Lightness also was achieved by the liberal use of alloy steels for many parts of the engine itself. By courtesy of the International Nickel Co., the following list of applications of alloy steel in the Winton engine is presented:

Crankshaft	2-3% Nickel
Connecting rods	S.A.E. 3130
Connecting rod bolts	S.A.E. 3130
Piston pins	S.A.E. 4615
Main bearing and cylinder head studs and nuts	S.A.E. 2340
Valve rocker lever	S.A.E. 3130
Rocker shaft	S.A.E. 3130
Camshaft	S.A.E. 3130
Cams	S.A.E. 4615
Valve bridge	S.A.E. 3130
Exhaust valve seat and lock	S.A.E. 3130
Valve lifted	S.A.E. 2335
Valve roller and pin	S.A.E. 4615
Push rod socket	S.A.E. 4615
Lash adjuster cams	S.A.E. 2320
Lash adjuster cam pin	S.A.E. 4615
Exhaust valve cap	S.A.E. 4615
Air compressor drive shaft	S.A.E. 3135
Water pump shaft	Stainless steel
All dowel pins	S.A.E. 3130

molybdenum and 1.50 to 2.00 per cent nickel.

Note: S.A.E. Nos. 2320, 2335 and 2340 are nickel steels; S.A.E. Nos. 3130 and 3135 are nickel chromium steels; and S.A.E. No. 4615 is a molybdenum alloy steel with 0.20 to 0.30

Direct connected to the engine through a flexible coupling is the main generator. This, a direct connected exciter and an auxiliary generator were built by the General Electric Co. The main generator supplies current for the traction motors and for two General Electric air compressors for the air brake system. The auxiliary generator supplies current for battery charging, train lighting and the air conditioning units. An Exide battery, made by the Electric Storage Battery Co., can be tied into the auxiliary generator bus and, when necessary, can furnish current for car lighting, car control, ventilating fan, radio converter and emergency cooking. The primary use of the battery which is housed in a stainless steel pit, is for engine starting. The bearings of the main and auxiliary generators, air brake and air conditioning motors and the General Electric main driving motors are equipped with SKF anti-friction bearings, by SKF Industries Inc. Philadelphia.



Another view of "Zephyr" on trial run, showing how one motor truck and three trailing trucks support the entire train of three articulated coaches
World Wide photo

Trucks, including one motor—and three trailer trucks, are of the four-wheel type, with frames and bolsters of low carbon, 2 per cent nickel cast steel furnished by the General Steel Castings Corp. These cast members are normalized and tempered for toughness and impact strength and for the retention of these properties at low temperatures.

Large steel castings, required for the articulation of car bodies, also were furnished by the General Steel Castings Corp. These are riveted to the stainless steel framework of the cars, this being the only application of rivets in the train.

The wheels of the motor truck are 36 inches in diameter and of the trailers, 30 inches. All axles are hollow-bored to reduce weight. Wheels and axles were furnished by the Bethlehem Steel Co. All journal boxes are equipped with tapered roller bearings, in which the cups and cones are of nickel alloy steel and the rollers of nickel molybdenum steel. The tapered roller bearings are by the Timken Roller Bearing Co.

Rubber insulation is inserted under the center plate, in equalizer spring seats and between the ends of equalizers and journal boxes to minimize the communication of sound and vibration from the trucks to the car body. U. S. Rubber Co., New York, supplied the rubber insulation. To reduce vibration, equalizers on all four trucks are equipped with helical-volute steel springs made by Cyrus J. Holland, Chicago. Elliptic springs are by Mather Spring Co., Toledo, O., and coil springs by American Steel Foundries, Chicago. Equalizers were furnished by the Camden Forge Co., Camden, N. J.

Air brake equipment, by Westinghouse Air Brake Co., is interesting in that aluminum is employed to an unusual extent to reduce weight. Control valves, brake cylinders, etc. are of this material, while the supply air reservoirs are of stainless steel.

Many Suppliers of Equipment

Train heating is provided by an oil fired boiler furnished by the Vapor Car Heating Co., Chicago. Mechanical air conditioning units made by the York Ice Machinery Corp., York, Pa., are provided for each of the three passenger compartments.

Included in the other materials and equipment in the Zephyr are the following:

Brake shoes, American Brake Shoe & Foundry Co., New York; side bearings, A. Stucki Co., Pittsburgh; hand brakes, National Brake Co., Buffalo; ventilating fans, B. F. Sturtevant Co., Boston; couplers, McConway & Torley Corp., Pittsburgh; copper screen, Newark Wire Cloth Co., Newark, N. J.; door locks, Russell Erwin Co., New Britain, Conn.; door tracks and hangers, Richards-Wilcox Co., Aurora, Ill.; exhaust fans, Robbins & Meyers Co., Springfield, O.; air-conditioning grilles, Uni-Flo-Grille Corp., Detroit; piping and fittings, Chase Brass & Copper Co., Waterbury, Conn.; special fittings, Crane Co., Chicago; monel screws and nuts, International Nickel Co., New York; fiber nuts, Elastic Stop Nut Corp., Elizabeth, N. J.; molding, Herron-Zimmer Molding Co., Detroit and Martin Perry Co., York, Pa.; cork floor, Armstrong Cork & Insulation Co., Lancaster, Pa.; hinges, Homer D. Bronson, Beacon Falls, Conn.; Soss Mfg. Co., Roselle, N. J.; and Stanley Works, New Britain, Conn.; diaphragms between cars, Morton Mfg. Co., Chicago.

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Making the Most *of* METHODS AND MATERIALS

Two Compounds Expedite Drawing of Stainless

A manufacturer of metal finishing materials has for the past several months been furnishing its trade with two water-soluble drawing compounds for use in drawing operations on stainless steel. The compounds are so constructed that they will take care of the lightest drawing operation as well as the heaviest and they are regulated by reducing with water, and in some instances a small percentage of oil until the proper consistency is reached to meet the requirements of the drawing operation satisfactorily. It is stated that best results are obtained when the company's engineers are allowed to inspect the dies and presses before recommending to what extent the compounds may be cut with water.

\$ \$ \$

Recently a manufacturer of cast-iron kitchen ranges was able to take an order because he was able to take advantage of bronze welding. He had on hand a stock or earlier model ranges. His prospective purchaser would have been satisfied with these except for the fact he desired an additional fixture. Bronze welding enabled the manufacturer to put a bracket where it was wanted and he obtained the order.

\$ \$ \$

Jigs and Clamps Assist in Welding Sheets

Properly designed jigs, clamps, and the like, are a decided asset in oxyacetylene welding sheet steel which is to be porcelain enameled. Jigs and clamps serve not only as a means for fitting and holding the parts firmly in place but also to conduct the heat out of the sheets. In light-gage sheets the expansion and contraction can be resisted or made to expend its effort in the welded seam itself. Clamps or holding devices which permit little play in the sheet allow the expansion and contraction to be taken up in the weld. Watercooled jigs carry away sufficient heat and resist the expanding action so that little distortion takes place in the sheet itself. When buckling and warping occur in the welded product, the enameler encounters strain or hair lines which show through numerous coats of enamel.

\$ \$ \$

Reaming Requires Lubricant

The purpose of reaming is to give smooth finish and extremely accurate size. Although the frictional heat of reaming is not as great as that of drilling, adequate lubrication and

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Fractured Bending Roll Weighing 80 Tons Repaired by Thermit Weld

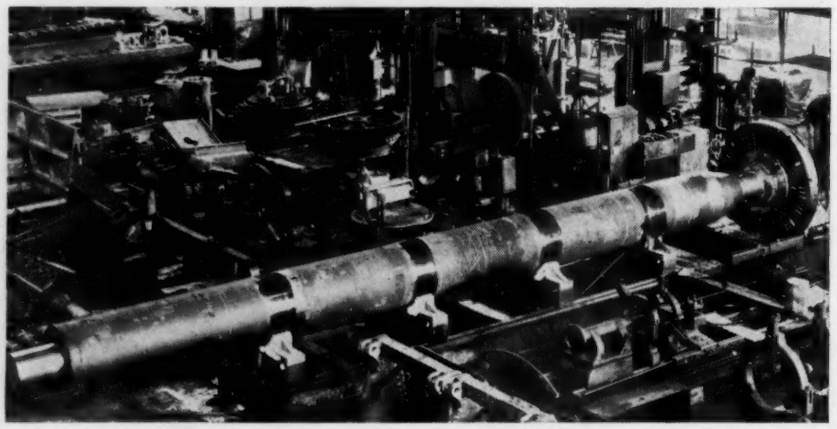
A LARGE bending roll in an eastern steel mill fractured recently and it was estimated that a new roll would cost \$12,000. Consequently, it was decided to undertake repair by the application of thermit welding.

The roll, 42 feet long, 36 inches in diameter, and weighing more than 80 tons, had fractured near one end. Preparations for welding included lining up the broken sections in as near perfect alignment as possible and cutting out the fracture with torches to provide the usual gap, in this case 2⅝ inches wide, for the weld metal. A mold box, 72 x 72 x 40 inches, was constructed around the break, and, in order to provide adequate heating of the massive roll, a brick furnace fired by by-product gas, was built on each side of the mold box.

The preheating operation required 54 hours. With the preheating completed, 3300 pounds of thermit, in two large crucibles, was reacted and 45 seconds later, the crucibles were tapped and the weld was poured.

After cooling thoroughly, the gates and risers of weld metal were cut away and the roll was placed in a lathe, and the entire collar of the weld machined off. Careful measurement showed the roll to be only 3/64-inch out of line. The repaired roll is shown in the illustration.

Cost of the entire repair, including dismantling, preparation for welding, welding, machining, and replacing the roll ready for service, amounted to \$3900.



ADVERTISING PAGES REMOVED

proper cooling are necessary to prevent digging, chattering and even small heating of the tool. Use of suitable cutting oil is essential for perfect workmanship and minimizes the number of rejects.

$ $ $

Alloy Iron Used for Guide Blades on Grinders

Heat treated alloy cast iron containing 3.25 total carbon, 1.25 silicon, 0.45 manganese, 2.00 nickel and 0.70 per cent chromium has been found extremely useful in the plant of an automobile manufacturer as rest or guide blades for centerless grinding operations where finished parts such as piston pins, valve stems, push rods, and the like, must not be scored or scratched while grinding. The heat treatment consists of heating to 1500 degrees Fahr., quenching in oil, reheating to 900 degrees and cooling in air to provide a hardness within the limits of 286-321 brinell.

Steel Floats in the Air

COBALT steel, an unusually magnetic material, is so powerful that a ring of it can float itself on air by magnetic repulsion. Principal uses are in the all-electric speedometer for trains, buses and automobiles and in the portable oscillograph which enables engineers to determine easily stresses in various parts of machinery, track rails and structural members in buildings.

$ $ $

Recommends Solution To Be Used in Pickling Castings

To remove sand from gray iron castings by pickling, use of the following solution is suggested: 6 gallons of 30 per cent hydrofluoric acid, 4 gallons of muriatic (hydrochloric) acid, and 40 gallons of water which is warm but not hot. From 8 to 24 hours will be required to remove the sand; the solution will have little effect on the castings, After pickling, the castings should be rinsed in cold and then in hot water. Sometimes a weak alkali bath is used between rinsings to insure removal of the acid. If pressure blasting equipment is available, however, there is no need to pickle the castings. Pressure blasting, properly conducted, will result in a clean surface on the castings.

$ $ $

Hearth Ring of Alloy Steel

An alloy steel hearth ring, to supplant the usual ring of fireclay composition, now is being featured as standard by certain manufacturers of oil burning equipment. It is claimed that the steel hearth speeds ignition. Chromium is the dominant alloy, ranging from 12 to 24 per cent generally, depending upon the pressure and requirements of radiation. One equipment manufacturer declares that its ring will withstand temperature of 3000 degrees Fahr.

$ $ $

A manufacturer of brewery equipment is using the metal spraying process to apply stainless steel inlays to tobin bronze pump shafts. The inlay is made only on that portion of the shaft which runs in the packing box. By this practice, life of the shafts is increased materially.

$ $ $

Following laboratory and preliminary service tests, a carload of 4-inch grinding mill balls produced from 4.50 per cent nickel 1.50 per cent chromium superhard chilled cast iron, recently has been put in service in a large metal mine. The initial tests, it is said, have indicated an improvement of 40 per cent over forged steel balls.

$ $ $

Abrasive dust entering oil reservoirs of bearings is distributed to the shaft and bearings by the oil rings. Where dusty conditions prevail, use of a wick oil bearing has been found to prevent the spread of abrasive material since the particles do not follow the wick to the bearing surfaces.

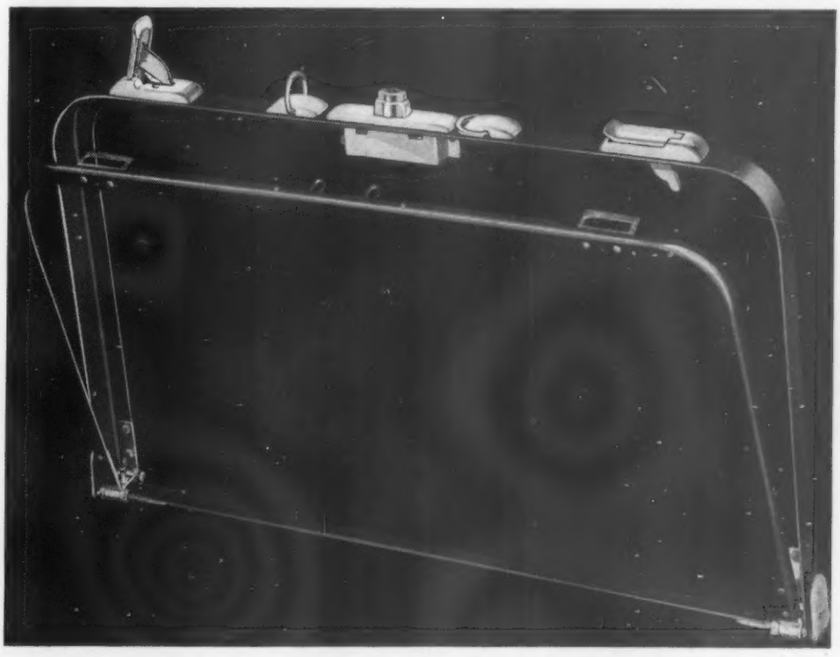
$ $ $

A 6-ton bolt has been forged from nickel-chromium-molybdenum steel to hold together the rotor disks of a 250,000-horsepower turbogenerator which will be installed in Philadelphia shortly. The bolt is 13 inches in diameter and 26 feet long.

Variety of Small Stampings Used in Luggage Hardware

BY W. G. GUDE
Associate Editor, STEEL

MANUFACTURE of luggage hardware, a relatively old industry, for many years has been an important outlet for small steel stampings. For the Milwaukee Stamping Co., Milwaukee, this product has provided the nucleus around which has been built a business in a variety of large and small stampings and assemblies of steel and other



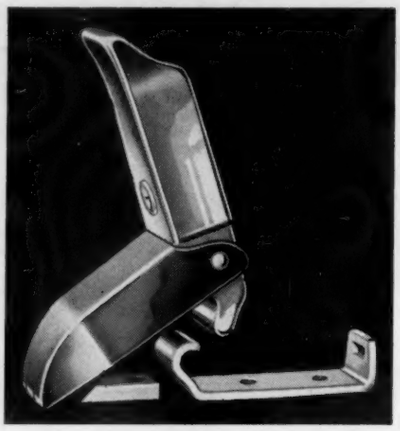
Miscellaneous small steel stampings enter into the construction of this metal frame for a popular type of hand luggage

metals. The company now is one of the country's largest makers of various types of luggage hardware, as well as automobile trunk hardware.

Facilities are available for producing all of the many metal parts required in various types of luggage. For hand luggage, of which the most popular type is the Gladstone bag, a frame with accompanying attachments, as indicated in the illustration, is required. Attachments, principally of steel, include latches, lock and lock plate, shoes, hinges and handle loops. Solid bronze is used for hardware on the most expensive bags. Various finishes may be obtained, including nickel, brass and statuary bronze; the frame being covered, is not plated.

The attachments are stamped on punch presses from cold-rolled strip steel, generally 14-gage. Lock parts are assembled by riveting, while the latch claw is welded in place. Introduction of a strip of spring steel in the latch assembly provides the necessary tension to maintain the latch in an open or closed position. All parts are plated before being riveted to the frame. The latter is made in three units and is fabricated from hot-rolled strip, about 18-gage.

Strips are cut to length and punched to accommodate whatever type of attachment is desired. The side members of the frame are formed into channel sections to give additional rigidity, and the corners then are formed. The latter operation is performed in a horizontal press of special design which prevents a bulging or excessive wrinkling of the compressed sections, and forms the two corners simultaneously.



For use on automobile trunks, this lock assembly comprises chiefly stamped steel parts

Frame sections are assembled and hinged and the unit then is ready for the luggage manufacturer's addition of the bag proper and the various attachments. Frames are made according to standard dimensions. A 24 x 8 x 14-inch Gladstone bag requires about 2½ pounds of steel hardware, including the frame.

Automobile trunk hardware differs in design from the hand luggage variety, usually comprising two locks which, when opened, serve as handles for lifting the trunk lid. This product assumed importance around 1920 with the introduction of baggage carriers on automobiles, and various lock designs since have been employed. One of the more modern types is shown in an accompanying illustration. A hinged section acts as a lever to force down the trunk lid in closing. This principle is used in connection with a variety of designs for the exterior of the lock. Various parts of the lock, excluding the key barrel, which is die cast, are stampings, made principally from 16-gage cold-rolled strip steel. The assembly is riveted together.

Facilities of the Milwaukee company are well adapted to the jobbing production of a large variety of metal products. Absorption of the Racing Spring Hinge Co., Racing, Wis., in 1919 and the Lawson Mfg. Co., Chicago, in 1924, both manufacturers of builders' hardware, enlarged stamping capacity, while acquisition more recently of Litterer Bros., Chicago, introduced shower stalls and toilet partitions as new products.

Manufacturing equipment now includes about 125 presses of different types ranging from kick presses, used principally in assembly work, to large units for drawing. A battery of automatic screw machines handles the production of many parts required for luggage and builders' hardware and other small assemblies. Complete facilities are available for nickel, chromium, brass and bronze plating as well as for lacquer and spray finishes and japanning.

SIMPLICITY KEYNOTE OF MODERN STEEL FURNITURE: Given added impetus by prominent display at A Century of Progress in Chicago, modern steel furniture of simple design and sturdy construction is becoming well established in public favor. Illustrated is a group of pieces manufactured by the Howell Co., Geneva, Ill. Seamless steel tubing, varying in diameter from ¼ to 2 inches, comprises the framework of the furniture, a special bending machine forming the tubing to the required shape. After polishing, either a heavy chromium or cadmium plating is applied, as desired. Upholstery materials are cloth fabric, leather or woven cane; table tops are of wood, metal or composition material

Statistics of Metals In Annual Compilation

Metal Statistics, cloth, 4 x 6 inches; published by American Metal Market, New York; supplied by STEEL, Cleveland, for $2, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

An annual issue, the volume for 1934 follows the plan of previous years. It contains a record of production, consumption, imports, exports, stocks, price fluctuations, annual and monthly averages data on brands, analyses, trade terms, customs duties and other statistics applying to finished and semifinished ferrous and nonferrous metals and raw materials.

New data on silver have been included in the present volume, covering production, consumption, imports and prices. Additions have been made also on economic subjects.

Will Install Separator To Demonstrate Value

As a means of demonstrating the value of induction separators built by the Magnetic Mfg. Co., Milwaukee, the company is offering to place

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one of its type K machines in operation in any plant for a nominal charge per day, with no purchase obligation involved. The equipment is adapted to magnetic separation of so-called nonmagnetic material by an intense magnetic field provided through the induction principle. Materials such as apatite, barium, corundum, garnet, potassium, silicon, talc, titanium, zircon and others are separated automatically and continuously by feeding into the separator, it is claimed.

Develops New Electrode For Class 1 Welds

A new general purpose welding electrode for producing welds of the quality required for Class I pressure vessels according to the A.S.M.E. boiler construction code has been placed on the market by the General Electric Co., Schenectady, N. Y. The new electrode, designated at type W-22, is of the heavily-coated, shielded-arc type.

The distinctive feature of the electrode is that it may be used in any position for flat, vertical or overhead welding, and at the same time has deep penetrating properties. It is therefore equally suitable for butt and fillet welds.

Properties of the Metal

Tests on all-weld-metal specimens made from the electrode show the following average results: Tensile strength, 65,000 to 75,000 pounds per square inch; elongation, 20 to 30 per cent in 2 inches; and impact resistance, 30 to 45 foot-pounds Charpy. In addition, welded joints average 35 to 60 per cent elongation when tested by the free bend method and x-ray, Class I.

Because these physical properties are obtained without regard to the position in which the welds are made, there is said to be no necessity for moving the work so that welding may be done in a down-hand position.

The new electrode, it is stated, has a wide field of application in the fabrication of large structures, such as ships and locomotives, where it is impossible or impracticable to move the work into a special welding position —and in the welding of such fittings as nozzles and flanges to pressure vessels, where handling costs are less if positioning of the work is unnecessary.

Introduces New Product for Repairing Surface Cracks

Shrinkproof patching material for permanently repairing broken and spalled wall surfaces both inside and outside recently has been placed on the market. The new powdered product, known as "wallseal" and manufactured by Stonhard Co., 401 North Broad street, Philadelphia, is mixed with water to produce a stiff paste, which dries in 20 minutes.

When used for building up large spalled areas or broken out window ledges, columns or cornices, slag may be added as an inert filler. It also can be used to repair spalled or broken walls or to fill exterior cracks; for calking around window and door frames; for setting rails in banisters; to fill cracks in concrete or composition floors; for sealing holes around pipes in floors or walls; as a plaster on walls or to repair cracks in old plaster; for making dustproof floor corners; to reset tile; for resetting and caulking vault lights in sidewalks and preventing breakage as well as seepage of water to basement; for pointing stone and brick; to fill cracks and joints in old wood floors; and, for filling cracks in pipe covering.

Bantam To Make Bearings For Army Dredge Pumps

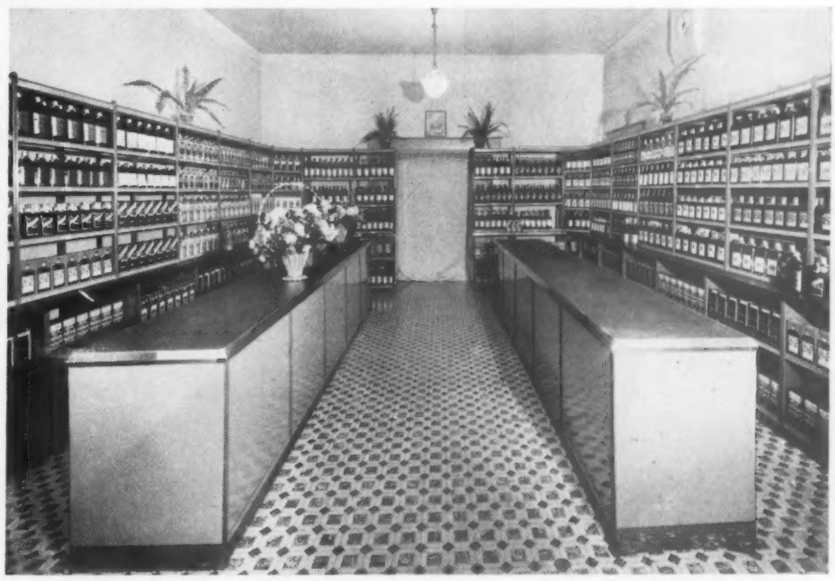
Bantam Ball Bearing Co., South Bend, Ind., has been awarded contract by the corps of engineers, United States army, for 48 single-row taper roller bearings to be used in the 28-inch dredge pumps now being built for use in the construction of the Fort Peck, Mont., dam. These bearings are 11⅝ inches inside diameter, 23½ inches outside diameter and 3⅞ inches wide. Pumps will be used to deliver mud from the bottom of the river bed through a pipeline to the top of the dam. The dam is 250 feet high, 2658 feet thick through the base and 9000 feet long.

Distributes Brazing Alloy

The recently-developed low melting point brazing alloy Sil-Fos, manufactured by Handy & Harman, New York, is now being distributed throughout the country by branches of the Air Reduction Sales Co., New York, as well as by leading supply interests. The alloy, which flows freely at 1300 degrees Fahr., is being used extensively in the brazing of nonferrous metals, such as in the manufacture of refrigerators, electrical appliances and equipment for the process industries.

Gas Action on Refractories

Action of gas atmospheres on refractory materials is surveyed by Stuart M. Phelps in bulletin No. 48 of the American Refractories institute, recently issued. Examples and data are presented to demonstrate clearly the pronounced and often intense action of gases upon the behavior of refractories.



LIQUOR STORES NEW OUTLETS FOR STEEL: Storage and dispensing equipment for retail liquor stores is fabricated almost entirely of steel. Adjustable wall sections for the storage of bottles are arranged to accommodate various sizes. Honeycomb inserts are available for storage of bottles which must be stocked in a horizontal position. Service counters, built in multiple sections, have stainless steel trim strips. Other equipment includes advertising sign holders, cashier's cage, show cases, bottle wagon and portable steps. Lyon Metal Products Inc., Aurora, Ill., recently introduced a complete line of such facilities, the above illustration being a typical steel-equipped liquor store in Illinois. Cabinets, various sizes of racks and barrel tap stands are listed among liquor storage equipment for use in clubs, hotels, wholesale warehouses, and the like

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SPECIAL CONTACT ROLLS FOR FOUR-HIGH MILLS

The National Roll & Foundry Company
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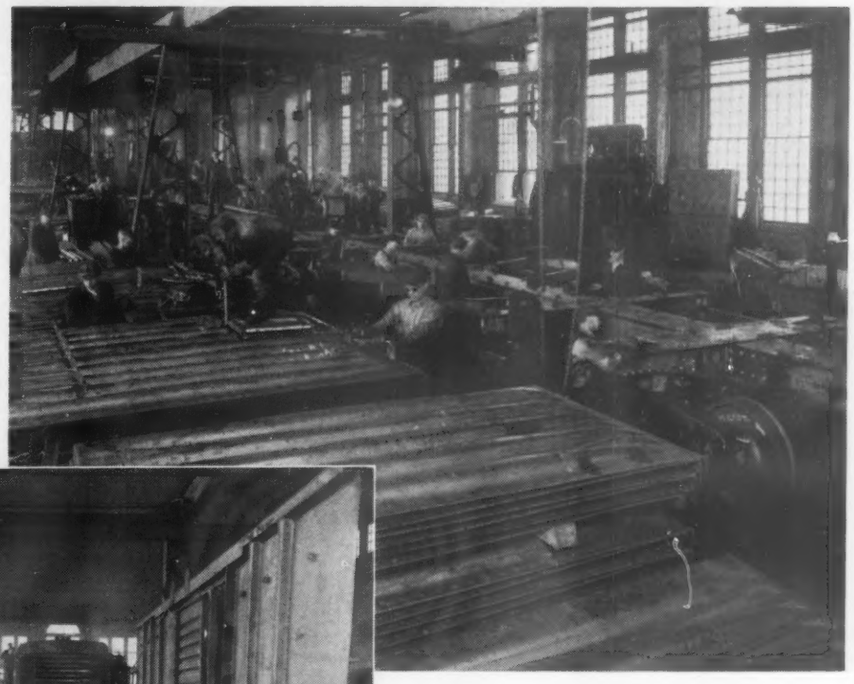
Renewal of Activity in Railroad Car Building

Stimulates Flow of Materials and Equipment

TANGIBLE evidence of the revival in freight car building is found in the activity of the Altoona shops of the Pennsylvania Railroad Co., where work is proceeding on the assembly of part of the order of 7000 all-steel automobile, flat and standard box cars —one of the features of the Pennsylvania's $77,000,000 improvement program initially financed by the federal public works administration.

The uppermost illustration shows the fabrication of steel underframes, with the cast steel trucks already in place on the car building assembly tracks. Assembly is progressive, the technic being similar to that employed in automobile assembly lines.

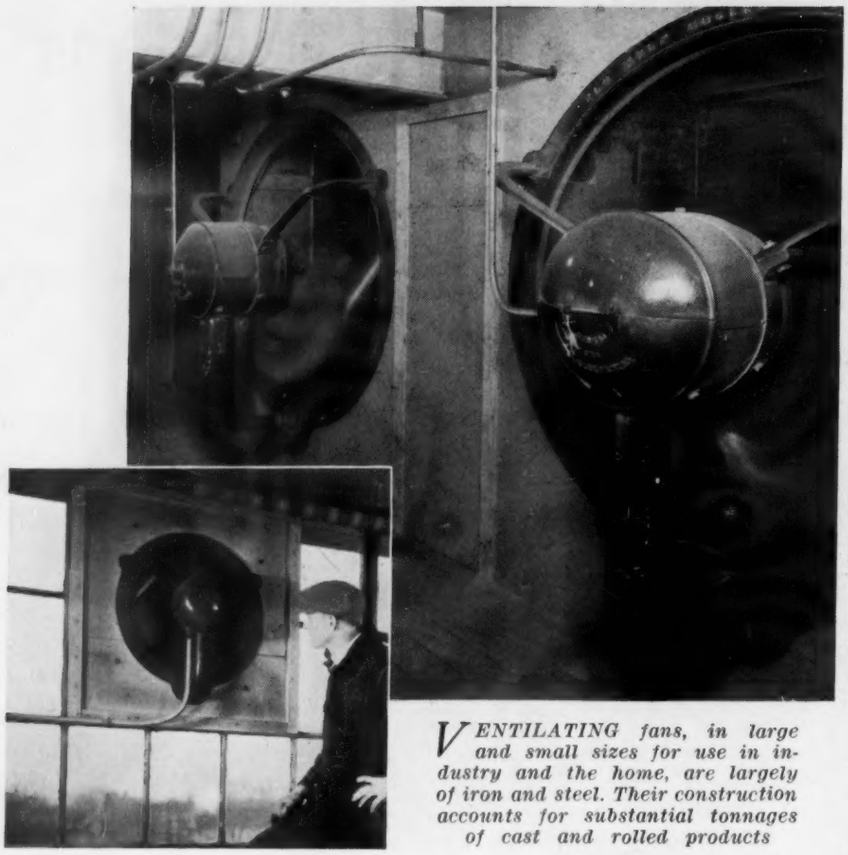


In the center illustration, the underframes having been completed, workmen are shown erecting the sidewalls. Sides, ends and many other members are partially assembled before erection on the cars.

With sides, ends and roof in place, the cars are ready for the flooring, the laying of which is shown in the lower illustration.

The entire Pennsylvania program is estimated to afford regular work this year for about 25,000 men on the railroad and in industry. The car building activity backs up into the rolling mills, foundries and parts manufacturing plants which furnish steel bars, plates and shapes, car wheels, axles, side frames, brake equipment, bolts, nuts, rivets, couplers, car roofing, etc.

The significance of reviving activity in freight car building is evidenced from the fact that in three depression years, car awards have been at rock-bottom levels. Only 10,694 cars were bought by railroads in the United States in 1931. In 1932 the total was 1749 and in 1933 it was 2460. Annual capacity of car building establishments is roughly 200,000 cars.



VENTILATING fans, in large and small sizes for use in industry and the home, are largely of iron and steel. Their construction accounts for substantial tonnages of cast and rolled products

Photos courtesy Ilg Electric Ventilating Co., Chicago

LARGE USES OF STEEL IN SMALL WAYS

260th Article ◆ Ventilating Fans

CONSTRUCTION of ventilating facilities for modern structures involves substantial tonnages of steel products, particularly in the erection of shafts and ducts. A large building may require several hundred tons of sheets in the fabrication of these units for use with blowers. Smaller installations for use in individual rooms do not necessitate the use of ventilating shafts but iron and steel are the principal materials from which such equipment is fabricated.

Ventilating fans of the types illustrated are employed extensively by industry and in homes, being used principally in the latter to eliminate cooking odors from the kitchen. Other important outlets for this equipment include offices, restaurants, garrages, stores, industrial plants and small theaters. Many uses are found for fans in manufacturing operations in addition to straight ventilation, such as drying, cooling, steam removing, paint spray work and fume removal. Fans also have been adapted to the ventilation of attics of residences and apartment buildings.

In the latter and in certain types of plant installations the fan is mounted on the roof and is enclosed within a sheet steel penthouse, exhausting the air through a duct or through registers from a room or the plant below. This system is adapted particularly to industrial plants where air exhaust is required from a certain area but is not necessary over the entire building. Housing for the fan in roof installations frequently is constructed of 16 to 20 gage galvanized sheets and steel angles. Gravity shutters to close the air outlet when the fan is not running are made of aluminum in order that they may open easily when air pressure is directed against them.

Propeller fans are principally of iron and steel. A popular type employs a fully enclosed motor which is ventilated by means of a vent pipe leading from the hood over the motor to the bottom of the frame. Suction created at the axis of the fan draws the air through the opening in front of the fan through the vent pipe and into the motor windings whence it is exhausted by action of the fan. This permits use of a smaller motor than would be required without ventilation, and by enclosing the motor, dirt and fumes are kept from the windings. The frame is of cast iron except in the case of the largest sizes where rolled steel is used for the arms.

The motor hood, which is removable, is spun from light gage cold-rolled steel, the fan blades being stamped from similar material. Blades are of the bucket type and are spot welded to the spokes of the spider as well as to the fan rim. Fans usually vary in diameter from 12 to 72 inches. Small sizes weigh about 20 to 75 pounds, with larger units ranging up to more than 1000 pounds. Motors may be either constant or variable speed.

Portable ventilating fans for kitchen use also are available, these being installed in the lowered window and having either a glass or sheet steel panel to which the fan is affixed. The unit may be moved from window to window as desired. Another type is designed for steel casemented windows, the fan being mounted to a small steel panel.

Report on Soil Corrosion of Pipe, Buried Ten Years

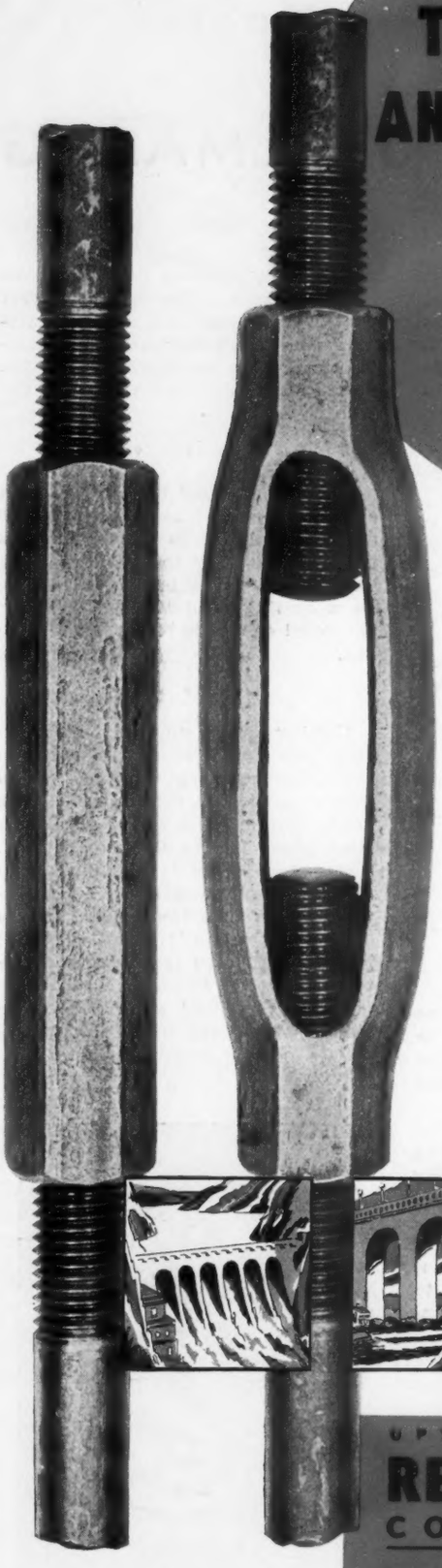
In 1922 the bureau of standards, Washington, began the study of the action of soils on buried pipe. Reports on this investigation have been issued at intervals of approximately two years. The first report described the soils and materials under investigation and the 1930 reports summarized all data then available. Recently a further report, by K. H. Logan and R. H. Taylor, has been issued, dealing with data on specimens removed from the soil during 1932. Report is identified as bureau of standards research paper RP638.

Consideration of these data does not materially alter conclusions reached earlier that the character of the soil controls the rates of corrosion of ferrous materials and that in the same soil all of the commonly used ferrous materials corrode at nearly the same rate.

Metallic protective coatings gave signs of failure, after eight years in several of the more corrosive soils. Several types of nonferrous metals and alloys tested have shown more resistance to soil action than the ferrous materials commonly employed.

TURNBUCKLES AND SLEEVE NUTS FOR HEAVY DUTY

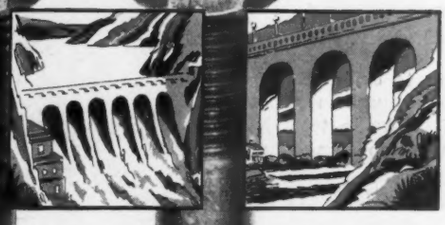
UPSON



Upson sleeve nuts and Brazil turnbuckles are the choice of industry for heavy duty service. They are ideal for bridge rods, foundation rods, electrification projects, dam construction, mill truss construction —wherever safety is a vital consideration.

Brazil turnbuckles have for years been considered standard. Design is sturdier. Arms are heavier. Threads are clean cut. They are made throughout to insure longer life in service.

Sizes and prices will gladly be sent upon request.



UPSON NUT DIVISION
REPUBLIC STEEL
CORPORATION
CLEVELAND, OHIO

PROGRESS IN STEELMAKING

NO STAKES or supports are required for a new closed joint for concrete highways which involves a vertical steel plate through which is threaded a zig zag steel rod. The shape of the plate provides an efficient slab interlock and the rod serves to lace the concrete slabs together. The newly devised joint is fabricated by a company in the Chicago district in standard 10-foot lengths.

♦ ♦ ♦

Annealing silicon steel sheets in an atmosphere of hydrogen imparts a beneficial effect to the magnetic properties of the steel, according to an authority.

♦ ♦ ♦

Castable refractory with a chrome base has been developed as a bottom material for furnaces. It is shipped in dry form ready to be mixed with water to form a stiff, plastic consistency after being applied. Advantages include long life and resistance to slag and abrasion.

♦ ♦ ♦

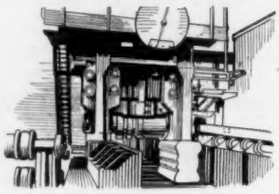
Applying hard facing material to the peel of an open-hearth charging machine ram at a Pennsylvania steelworks has extended its campaign considerably.

♦ ♦ ♦

Air passing through the regenerator walls of an open-hearth furnace under working conditions has been determined in England by a simple method. In the stem of a large tin funnel is fitted a Pitot tube. The wide end of the funnel is held firmly against that part of the regenerator wall selected for examination. Close contact between the regenerator and funnel is secured by wet ganister. The differential pressure set up by the flow of the air induced along the stem of the funnel is measured with the aid of a micromanometer. By taking numerous observations over external regenerator surfaces both during the ingoing and outgoing periods, it is possible to ascertain the quantities of air passing into the air regenerators during the "on air" and "on gas" periods.

♦ ♦ ♦

Surface decarburization of steel is prevented by the presence of 0.8 per cent silicon because of a lowering of the melting point of the silicon-bearing slag and a subsequent burning off of the surface of the steel, according to a recently completed analysis.



A STEELWORKS in the Great Lakes district, which is planning to install a new blooming mill and a continuous wide sheet mill, has plans to make deep-drawing stripsheets without either cross rolling or the use of normalizing equipment. The mill as yet has not worked out satisfactorily a short-cut of this nature but hopes to roll slabs continuously. Furthermore, this interest desires to be in a position to take a 16,000-pound ingot, cut in half, and roll it down to 48 x 12 x 4-inch slabs on the contemplated blooming mill.

♦ ♦ ♦

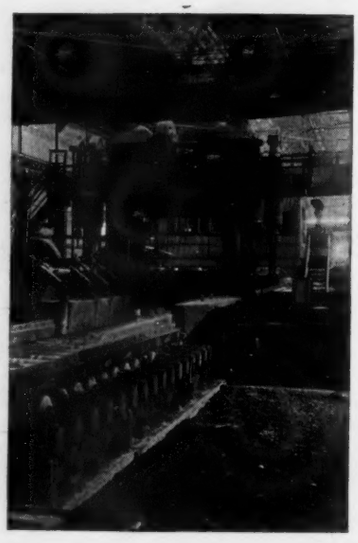
Wire with a clean smooth bright surface and free of spots and discolorations is secured regularly by annealing continuously in a horizontal metal tube containing an atmosphere of hydrogen. At a New England plant where this method is practiced the annealing installation includes an electrically-heated compartment in which a portion of the tube is located. The remaining part of the tube serves as a cooling chamber. The wire under treatment passes through the heating zone into the anealing chamber and thence to the spools.

♦ ♦ ♦

Electroplating of black plate with copper to be fabricated into cans for shipping automobile lubricating oils from the refinery to the filling stations is now being practiced. Based on a coating of 0.00002-inch about ½-pound copper is required per base box.

♦ ♦ ♦

Cutting circles up to 8 feet diameter from square mild steel plate up to ⅜-inch thick at a speed of 75 feet a minute is the capacity of a newly devised shear installed at a steel plant in the Chicago district. The square plate is clamped pneumatically in the circle cutting attachment and a true round head with a clean square edge is cut without first having to remove the corners. Cutters operate continuously. The upper unit is raised and lowered instantly by a crank which is actuated by a swinging member.



ADVERTISING PAGES REMOVED

The Plastic Forming Of Metals

By PROFESSOR DR.-ING ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

Part III—Investigations of Distribution of Deformation and Stress in Technical Forming Processes

4. Stress Relations in the Skew Rolling Process (Continued)

EXTERNAL forces are applied only on the surfaces of contact between rolls and bar, that is, along the distance (A-B) in Fig. 165, in the process of cross-rolling an individual disk between cylindrical and parallel rolls. The normal force (N) acts perpendicularly to the surface; while the tangential force (T) acts in the peripheral direction, and is transmitted by the friction of the roll surface upon the bar. The resultant forces (R) first must suffice to overcome the deformation resistance, and second, since no other external forces act, they must be in equilibrium with each other; they therefore must be equally great and oppositely directed. The torque on each roll, which is required to produce the deformation, has the magnitude $l \times R$ or $r \times T$, and the total rolling energy (L), with an angular velocity (ω) or a peripheral velocity (V), accordingly amounts to:

$$L = 2 \times \omega \times l \times R = 2 \times T \times V.$$

Execution of the cross-rolling process is possible only as long as the condition

$$\frac{T}{N} \leqq \mu$$

(μ = coefficient of friction) is satisfied; otherwise the rolls slide on the bar. Inasmuch as the width of the area of contact (A-B), and therewith the inclination of the resultant (R) and the ratio (T/N), increase with increasing roll pressure, the cross-rolling process therefore comes to a standstill if the rolls press too deeply into the bar.

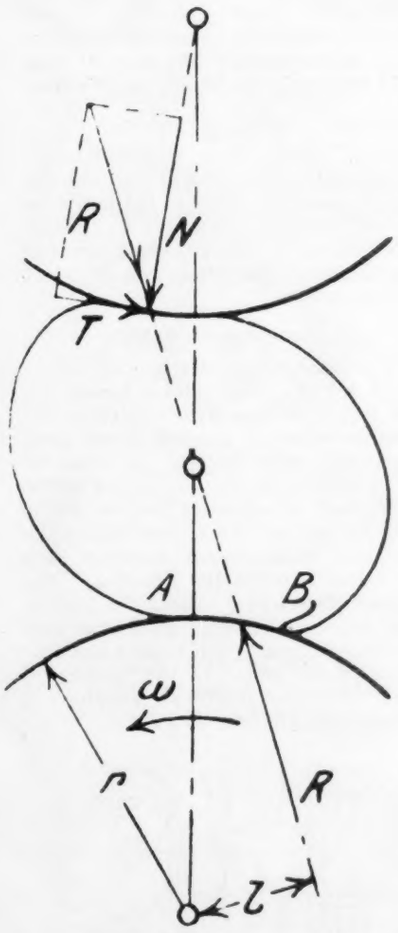


Fig. 165—Equilibrium of forces in cross rolling of a disk between cylindrical rolls

How Equilibrium Is Established

If a thin disk is subjected to cross-rolling between conical rolls, the axes of which are placed parallel to each other, the normal forces are inclined to the plane of the disk; and in that case equilibrium can be established, according to Fig. 166, only when corresponding reactions to the frictional forces exist; that is, axial components of the frictional forces must be established, which are equally great and opposed to the axially-directed components of the normal forces. The frictional forces now act no longer in the direction of rotation of the rolls, but inclined to this direction by an angle γ, which becomes the larger, the greater is the inclination β of the cone surfaces, and consequently, the greater are the axial components of the normal forces. Fig. 167 shows that the frictional forces acting in the direction of rotation are the smaller, the greater this inclination becomes. Since the absolute magnitude of the possible frictional forces is stipulated by the coefficient of friction acting upon the designated arc, each increase of the component of the frictional force, which act along an enveloping line, is accompanied by a reduction of the frictional force acting in the direction normal to this line. Moreover, the permissible deformation with which transverse rolling is still possible is reduced. If the inclination of the conical surfaces reaches the magnitude of the coefficient of friction, so that:

$$\tan \beta = \mu;\ \gamma = 90°, \text{ and } T_{II} = T'' = 0;$$

a deformation by means of transverse rolling is no longer possible.

The cross-rolling process between conical rolls with parallel axes would come to a standstill quickly. The formation of the frictional forces which are required for the condition of equilibrium stipulates a gradual sliding-out of the disk toward the open side of the pass; because a relative displacement occurs between rolls and bar which forms the angle

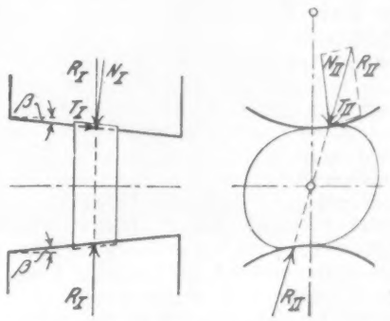


Fig. 166—Equilibrium of forces in cross rolling of a disk between cone-shaped rolls

(γ) with and in opposition to the direction of movement of the roll surface. The termination of the cross-rolling process is accelerated still further by the circumstance that, as

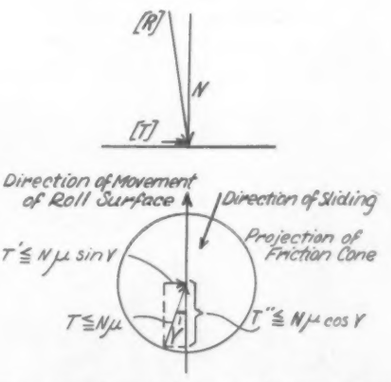


Fig. 167—Formation of friction forces on area of contact in cross rolling shown in Fig. 166

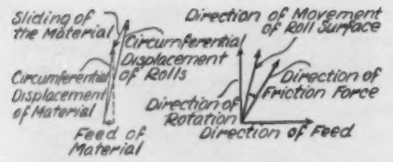


Fig. 168—Relations of movement along area of contact in skew rolling

described at the beginning, a severe displacement of material also takes place in the axial direction, as well as a corresponding diminution of the diameter of the disk; so that, briefly, a condition is reached in which no further deformation occurs. However, if the axes of the rolls are inclined to each other by a small angle, so that they are inclined to the axis of the bar; the condition illustrated in Fig. 168 can be reached, in which the backwardly-directed component of the relative displacement of the rolled material is not only offset, by the feed component of the displacement of the roll surface, but the billet even receives an absolute feed in the axial direction.

Forces Must Be Considered

Practically, a round bloom or billet is rolled in the skew-rolling process, instead of a single disk. If the equilibrium of forces is considered for a disk which forms a part of such a billet, the forces originating from the cohesion of the material and those exerted by the rolls also must be included. Thus, for the disk considered in the entering cone, an arrangement of forces is obtained which is similar to that shown in Fig. 169. The resultants of the forces transmitted by the rolls have the subscript (w), while those transmitted by the cohesion of the material have the subscript (m). The forces (R_w) exerted by the rolls now maintain equilibrium only in exceptional cases. However, since the totality of all the forces applied to the bar must be in equilibrium, the forces (R_m) applied in the axial direction and the torque (M_m) acting in the cross section of the bar change their magnitudes at each point of the bar. In the first section of the pass in a Mannesmann mill, the tube blank is subjected to severe torsional stresses, which arise from the following circumstances. Because of the conical shape of the rolls, their peripheral speed becomes higher with increasing roll diameter as the tube blank moves forward in this section; whereas the relations are reversed for the tube blank, because of its steadily decreasing diameter. In the customary cone and disk piercing arrangements, severe torsional stresses likewise occur in the first section of the pass. A means of avoiding these torsional stresses, in which separate pairs of rolls were proposed for the passes in the first and second sections, was pointed out by J. Gassen[101].

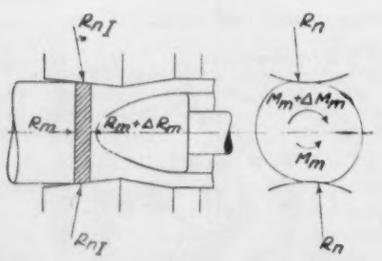


Fig. 169—Equilibrium of forces in first roll section

In the second section of the pass, the mandrel forces (R_d) enter (Fig. 170), in addition to the forces transmitted by the rolls and the forces (R_m) produced by the cohesion of the material. The components of the roll and mandrel forces, which are directed radially to the axis of the bar act, in this case, in conjugate pairs, to produce the transverse de-

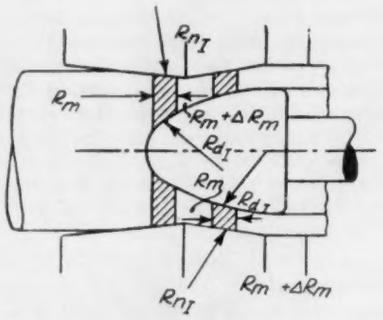


Fig. 170—Equilibrium of forces in second roll section

formation. Their magnitude is found as the product of the specific deformation resistance and the area of contact. Only a narrow strip, corresponding to the area of contact with the roll, thereby is subjected to the mandrel pressure, and the cross section of the tube assumes an elliptical shape. At the delivery side, the direction of the conicity of the rolls is reversed from that in the forward part of the pass. The feed component of the roll forces (R_w) increases correspondingly. Nevertheless, the feed force (R_m) usually decreases still further, as long as the pass opening contracts; because the mandrel forces acting upon the bar are approximately equal in magnitude to the roll forces, but have, however, a frictional component acting in the opposite direction. Nevertheless, under certain circumstances, an increase of the feed forces also can occur here, if a pronounced relative displacement of the bar takes place toward the rear, with respect to the surface of the rolls.

Finally, if a complete representation is sought regarding the axial forces (R_m) which are transmitted

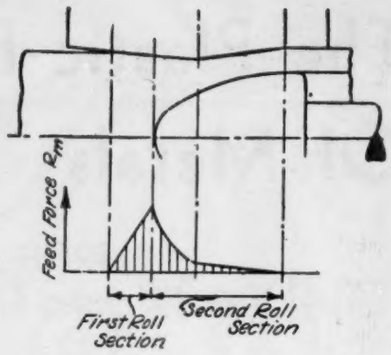


Fig. 171—Variation of feed forces

from cross section to cross section, these forces are equal to zero beyond the range of action of the rolls. In the first section of the pass, then, they increase up to a maximum value; and in the second section they first diminish rapidly along the point of the mandrel, and then, after passing the high points of the skew rolls, they decrease gradually with the diminishing narrowing of the pass opening, to a value of zero in the delivered cross section (Fig. 171). A statement of the distribution of stress in the individual cross sections is not yet secured from this representation of forces. In the first section of the pass, according to the initial discussion, a stress distribution approximately like that of Fig. 172 must exist, in which the relation:

$$\int_{O}^{F} \sigma \times dF = R_m$$

is always valid. Since neither the shear stresses exerted in the individual parts of the cross section nor the directions of the principal stresses are known, this conception of stress is incomplete.

Similar Data Apply

Considerations similar to those used for the longitudinal forces can be employed also with regard to the torque acting in the individual cross sections. The torque is equal to zero beyond the zone of action of the rolls, and assumes its greatest value in the pass at the points where the relative displacement between rolls and bar reverses its direction. The shape of the pass causes the bar, in the Mannesmann process, first to precede and then to lag behind the surface of the rolls. In the vicinity of the delivered cross section, a

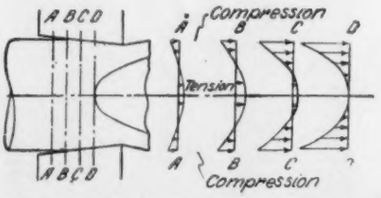


Fig. 172—Distribution of axial stresses in first roll section

Time and motion studies on *Weighing...?*

Yes! Weighing operations in every industry and in practically every type of plant have been the subject of the searching scrutiny of Fairbanks scale engineers. Often production men have taken for granted weighing as a separate and distinct operation which necessitated inescapable penalties of time and motion.

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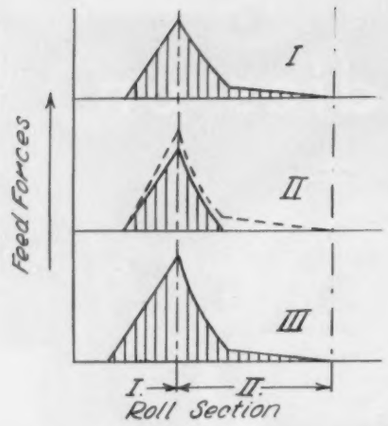

Fig. 173—Variation of feed forces

tendency toward forward slip usually exists, in addition. In the cone, piercing, and expanding rolling mills, as has been shown by F. Korber and K. Simoneit[104], as well as by K. Gruber[105], torsional stresses in both roll sections can be avoided almost completely. The treatise by F. Kochs[101] offers abundant observations concerning the influence of the torque and of the displacements upon the flow of material.

Equilibrium Is Important

The prerequisite for the execution of skew-rolling is the equilibrium of the axial feed forces (Fig. 173, case I). If this equilibrium is disturbed, as for instance if the reduction ratios at the beginning of the second section of the pass are altered, the decrease of the axial compressive force can become so great that the rolling process is stopped at A (case II), because here no feed forces exist. Usually, however, by a corresponding retardation of the feed, and the alteration of the direction of the frictional forces which is effected thereby, a new condition of equilibrium similar to that of case I can be established. Otherwise, the shape of pass in the first section must be so altered (case III) that the necessary axial forces exist, or the equilibrium of forces must be re-established by other means, such as readjustment of the rolls, or thicker initial cross section.

In practice, the requirement of work for skew-rolling always must be considerably higher than that of an ideal (frictionless) process like that described in Part II, section 7; because losses in the conversion of energy cannot be avoided. Such losses occur, if the sources of loss in the roll drive are excluded as frictional losses, as a result of the relative displacement between rolls and bar, and also because of additional deformation of the bar.

Relative displacements between rolls and bar cannot be avoided. They are stipulated by the condition of constant volume of the rolled material, which requires that the volume passing through each point of the pass in unit time must be the same. It accordingly is required that:

$$\frac{dV}{dt} = F \times \frac{ds}{dt} = F \times V = \text{constant};$$

that is the feed velocity (V) at each point of the pass is inversely proportional to the area of cross section (F) of the rolled material. For instance if the cross-sectional area of the bloom is 2½ times that of the pierced tube then the velocity of feed must increase from the beginning to the end of the pass to 2½ times its initial value (Fig. 174). The changes of velocity of the roll surface in the axial direction in the Mannesmann tube mill, are only a fraction of this amount, and therefore remain wholly in the background. The frictional losses produced by the displacement of the material cannot be avoided. Only the superfluous displacements can be avoided, which occur if the rolls cannot cope with the material supplied in the second section of the pass, due to unsuitable design of the pass.

Waste of Energy Is Disclosed

Additional deformations likewise cannot be prevented, although they can be limited. Particularly, too great a draft in the first section of the pass, and accordingly a severe distortion, signifies a waste of energy which results in an extremely disadvantageous distribution of stress in the rolled material. Here it is probably sufficient to provide only as much draft as is needed to produce the radial tensile stresses in the center, which are essential for the limitation of the pressure on the mandrel, and which permit the formation of the hole to be carried out with the co-operation of the mandrel. Naturally, each twisting of the bar and of the formed hollow body causes a loss of energy, accompanied by an injurious distribution of stress in the material. An avoidance or reduction of this, by suitable design of the pass, accordingly must lead to an improvement in the efficiency of the forming process.

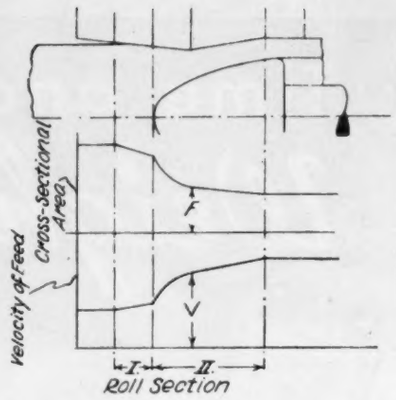

Fig. 174—Variations of cross-sectional area and velocity of feed in skew rolling

Requires Further Study

A review of the discussion reveals that a complete knowledge of the skew-rolling process is still far distant. We possess only a qualitative conception of the forces, stresses and deformation in the pass, without the means for evaluating in mathematical form the various effects under which the skew-rolling process can be carried out. Further progress requires a detailed investigation of the cross-rolling process, and of the transverse rolling process over the mandrel, separately, as well as of the complete process, with measurements of the resulting forces and requirements of energy. Investigations of the stresses produced in the bar by the roll forces, their relation to the deformation strength of the rolled material, and their effect upon the flow of material, must go hand in hand with this. Furthermore, an extension of the available knowledge regarding the frictional relations between rolls and bar, or in other words, concerning the mechanics of the frictional transmission of forces to plastically-stressed material, is necessary. Only when this preliminary work will have been performed will the fundamentals be available which will permit an exact comprehension of this complicated rolling process.

(The End)

Plastic Forming Series To Appear in Book Form

THIS is the concluding installment of Mr. Siebel's important series of articles on "The Plastic Forming of Metals," which have been appearing in STEEL, *continuously since the issue of Oct.* 16, 1933.

The voluntary response from readers has been such as to indicate that the author and publishers will be justified in reprinting the articles in book form. Readers and others who would welcome the appearance of the series in more permanent form are invited to write to the editor of STEEL, *so that we may have a clearer conception of the volume of demand.*

[104] F. Korber and K. Simoneit: Uber den Lochvorgang im Stiefelwalzwerk usw.; Mitt. K. W. Inst. Eisenforsch. 11(1929)p.353.

[105] K. Gruber: Uber Querwalzverfahren zur Herstellung grosser nahtloser Rohre; Mitt. K. W. Inst. Eisenforsch. 12(1930)p.285.

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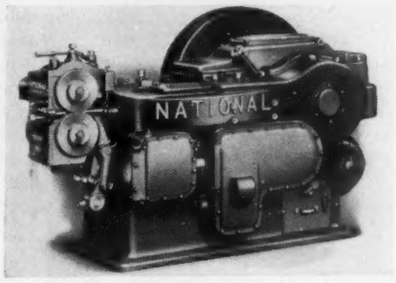
PRODUCTION FABRICATION
TREATMENT FINISHING

Cold Headers—National Machinery Co., Tiffin, O., has placed on the market a new line of single and double stroke, both solid and open die, cold headers in all sizes to 1-inch capacity. The units, shown herewith, have short compact bed frames, and employ an over-arm heading slide which provides bearings for the slide, both at the front and rear of the crankshaft, and enables the distance



Cold header recently developed by National Machinery Co.

from the shaft to the front of the machine to be materially shortened. This greatly reduces the spring or deflection in the bed frame and parts; reduces the amount of energy required and greatly assists in making accurate well filled heads even where a maximum amount of gathering or upsetting is required.

Wire is fed to the machine at an angle, in order to provide a squarer end on the blank, and a new type of cutoff and carry-over is employed. The carry-over mechanism holds the blank rigidly, but it is held open at the time of feeding and does not snap off of the blank on its return movement, so that there is no scraping of the wire. An entirely new principle is employed on the double blow machines for transferring the position of the coning and heading tools; the tools are shifted from one position to the other by an oscillating bolster. The movement is smooth and easy. The backing or support has been materially widened in comparison with previous designs, so that the tools are more rigidly supported in position and it becomes easier to produce accurate work. Independent adjustments are provided for both the coning and heading tools, and quick changing or adjusting the dies or tools is facilitated.

Safety devices are provided at the necessary points throughout the machine, but all of these are automatic and no shearing blocks or plates are used. Quick adjustments are provided for the wire feed and stock gage, and all of the controls are conveniently arranged to simplify the handling of the machine.

♦ ♦ ♦

Electric Drill—Black & Decker Mfg. Co., Towson, Md., recently introduced a new ¼-inch electric drill. Balance and ease of handling are features. Motor power has been increased 33 1/3 per cent over previous models. Antifriction bearings are used throughout, with the armature and chuck spindle mounted on ball bearings. There is also an entirely new switch handle. The tool weighs only 5¾ pounds. A universal motor furnished for all voltages, is employed.

♦ ♦ ♦

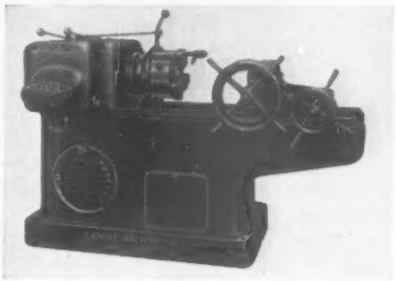
Master Control—Swartwout Co., 18511 Euclid avenue, Cleveland, recently brought out a master control. The equipment consists of the pressure regulator to which is attached a small indicating dial, and the two main pressure gages, all enclosed in a tamper-proof case. A removable crank is used in adjusting the pressure. A turn of this crank sets the hand on the small dial to the desired pressure which is automatically set up and accurately maintained. Many problems of accurate control and pressure regulation in all industries can be handled by the Type CPQM master control.

♦ ♦ ♦

Automatic Roll Polisher—Streine Tool & Mfg. Co., New Bremen, O., recently placed on the market a Wahlert self-cleaning roll polisher, shown herewith. It consists of a pair of cylindrical revolving abrasive polishing rolls, each of these which rides on two sharp, slowly rotating, cerated and chilled cleaning rolls, thus allowing the polishing rolls to turn in the same direction as the mill rolls, but at a much slower speed. This sets up a polishing action and at the same time keeps the polishing wheels clean and free of glaze. These polishing wheels by means of a simple feed and reversing device, are caused to traverse back and forth over the entire surface of the mill rolls at a predetermined speed, thereby automatically keeping the mill rolls polished perfectly smooth.

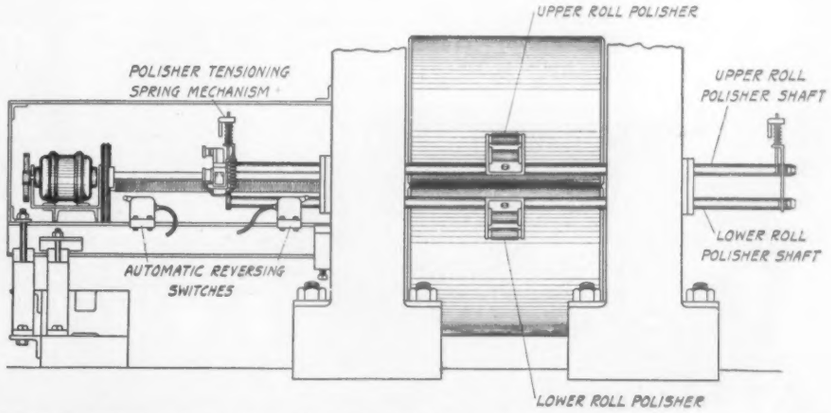
♦ ♦ ♦

Threading Machine—Landis Machine Co. Inc., Waynesboro, Pa., now is offering its threading machine,



New 2 and 2½-inch threading machine designed by Landis Machine Co.

shown herewith, in 2 and 2½-inch sizes. This unit formerly was built only in 1 and 1½-inch sizes. The new units have capacities from ½-inch to 2 inches and ½ to 2½ inches respectively, and are made in both the single head and double head models. Both sizes and models can be equipped with leadscrew attachments. The 2 and 2½-inch machines are patterned closely after the small-



Wahlert self-cleaning automatic roll polisher recently placed on the market by Streine Tool & Mfg. Co.

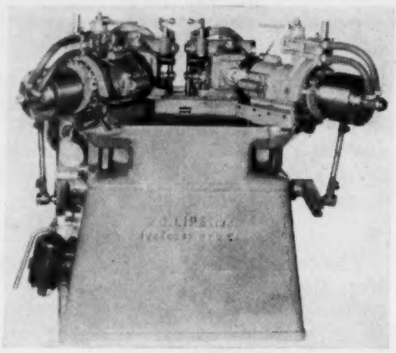
er machines and have the same distinctive features of design including the geared headstock with chrome nickel steel gears, spiral bevel gear spindle drive, antifriction shaft and spindle bearings, built-in reversible coolant pump, friction clutch control, double wall bed, covered guides, etc. They are sturdy and rigid in construction and have a wide speed range. All controls are centralized and within easy reach of the operator. Particular care has been exercised in the design of the machines to provide maximum ease of operation.

♦ ♦ ♦

Gear Tooth Chamfering Machine—W. C. Lipe Inc., Syracuse, N. Y., announces a new model of its gear tooth chamfering machine, shown herewith, which chamfers teeth at speeds up to 150 teeth per minute.. The principle of high-speed index is incorporated in this new model. Cutter spindle assembly has been completely redesigned. The square sleeve in which the spindle rotates has been increased in size to provide longer wear and greater rigidity. Rack and pinion for driving the square sleeve are made of preheat treated steel. The rack is so mounted that it can be turned end for end as wear occurs, or can be replaced without replacing the square sleeve.

Worm feed carriage for the work head is provided for rapid and accurate adjustment of the work when setting up the machine. Precision scales are furnished for registering the setting of the various adjustments, and the worm feed carriage has a vernier dial in addition to the scale readings.

The new model machines will chamfer all kinds of gears and pinions, such as spur, helical, internal, intermittent and spiral bevel. They will also chamfer splines, cut back intermittent teeth and drill. Particular care has been given to providing for easy and quick change of setup when a variety of gears are to



Lipe high-speed gear tooth chamfering machine

be run on one machine. The machine is built in both double and single spindle models and also in a special model for flywheel ring gears.

♦ ♦ ♦

Automatic Screw Machines—National Acme Co., Cleveland, now is building a complete line of automatic screw machines. The new model R four-spindle units range in capacity from ⅞ to 2¼ inches, and supplements model GA which is built in sizes from 2⅝ to 3½ inclusive. The accompanying illustration shows the 1-inch model R.

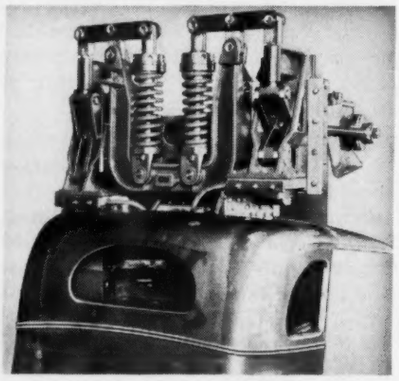
High productive capacity of the new model is due in part to the rapid and smooth indexing of the spindle carrier. The machine is arranged to thread in the second or third positions, or both, in all sizes, and the same slide and operating mechanism, in either position, can be used for accelerated reaming or turning operations. The slide in each position is operated by a separate cam, thus giving a selective feed in either position.

To employ both forming tools and drills at the correct relative surface speeds for each tool, high speed drilling attachments can be used in all four positions—driven directly from the center gear mounted on the end of the spindle carrier stem. Only one drive is required from the gear box to this center gear. An improved disappearing stock stop makes possible the use of standard tooling in the fourth position and this for many jobs is the equivalent of an additional work spindle.

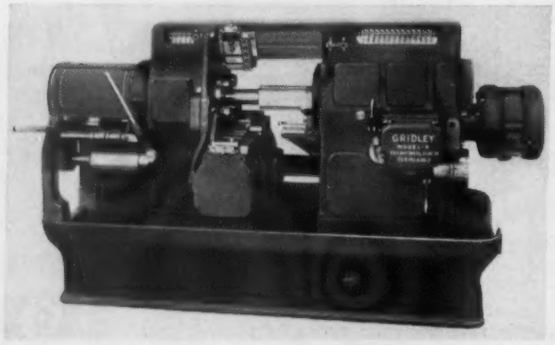
The model R machine carries into the large sizes the same box form construction as developed and found so successful in the ⅞-inch size. The heavy tie piece on top of the machine securely anchors the gear box section and spindle carrier section into one rigid unit. This design permits operation at unusually high speeds suitable for use with special tools such as tungsten carbide or tantalum carbide. An unusually large space is provided for chips which rest on a steel plate for quick drainings. They can be removed from either end of the pan while the machine is operating thus avoiding one common source of idle time.

♦ ♦ ♦

Welding Process—Thomson-Gibb Electric Welding Co., 163 Pleasant street, Lynn, Mass., has developed a new two-head double-stroke welding press, the accompanying illustration of which shows an interesting application. Two gusset plates are being welded to the top rail and back panel of an automobile body. Sixteen projection welds are made with each stroke, which means that 32 welds with each revolution of the crank. The unit handles this job rapidly and with a minimum of handling. Built like a heavy-duty machine tool, the unit is capable of holding its own in the production line of any modern plant, the manufacturer declares. It has a smooth powerful toggle action and is equipped with quick changing dies, faced with Elkonite inserts and water cooled.



Two-head, double-stroke Thomson-Gibb welding press



NEW 1-inch model R automatic screw machine developed by National Acme Co. This size is driven by a 7½-horsepower motor mounted directly on the driveshaft

Steel Tested *for* FLATNESS

THIS illustration shows why Granite City Steel gives you that extra flatness so desirable in your fabricating operations. This special testing truck is a positive check for flatness. It was originally used on jobs where specifications required a degree of flatness unnecessary in ordinary fabricating work. Its use has so influenced production practice at the mill that all Granite City commercial sheets provide unusual freedom from "waves"—insuring the kind of work that adds extra quality to your finished job.

Try these wave-free sheets, properly pickled, generously galvanized, carefully gauged and sheared. Granite City Sheets are easy to work. They speed up your operations. And Granite City adds super service to quality. An ideal location—15 minutes from St. Louis—expedites shipments. Twenty-nine railroads and the Mississippi River serve this mill, assuring better service to the Mississippi Valley, the West and the Southwest.

GALVANIZED SHEETS
STEEL SHEETS
PLATES AND
TIN PLATE

NRA
U.S.
WE DO OUR PART

SINCE
GRANITE CITY STEEL
1878

GRANITE CITY STEEL CO

GRANITE CITY, ILLINOIS
5719 Ellsworth Ave., Dallas
916 Walnut Street, Kansas City
1805 Boatmen's Bank Bldg., St. Louis
1613 Pioneer Building, St. Paul.
1502 Mariner Tower, Milwaukee
110 South Dearborn Street, Chicago

Here and There In Industry

STREINE TOOL & MFG. CO., New Bremen, O., has acquired rights to manufacture the Wahlert self-cleaning automatic roll polisher, which it is just placing on the market. The device has been in actual operation for two years on 15 sheet and tin mills of the Granite City Steel Co., Granite City, Ill., which is now equipping the remainder of its mills.

□ □ □

Perin Engineering Co. Inc. has moved its offices from 11 West Forty-second street, to 535 Fifth avenue, New York, twenty-sixth floor.

□ □ □

Ford, Bacon & Davis, engineers, have removed their offices to the Field building, 135 South LaSalle street, Chicago.

□ □ □

Rogers, Brown-Lavino Co., Philadelphia, has moved its New York sales offices from 21 East Fortieth street to 149 Broadway.

□ □ □

National Slag association moved its offices from the Leader building, Cleveland, to the Earle building, Washington, May 1. H. J. Love is manager.

□ □ □

Austin Co., industrial engineer and builder, has moved its eastern headquarters from 120 Broadway to 19 Rector street, New York, effective May 1. J. K. Cannett, vice president, is in charge of the New York office.

□ □ □

Ferro Enamel Corp., Cleveland, is adding to its office space to accommodate the staff of the Allied Engineering Co., which is moving from Columbus, O. The latter becomes part of the Ferro Enamel Corp., handling pottery frit kiln and supplies sales.

□ □ □

Ironton Fire Brick Co., Ironton, O., has appointed Glencoy Specialties Co., Zanesville, O., its special representative in eastern Ohio, western Pennsylvania and part of West Virginia. The Glencoy company consists of William McCoy, H. F. Crew and W. M. Hughes.

□ □ □

Heil Co., Milwaukee, manufacturer of steel tanks, motor truck bodies, oil burners, air pumps and similar products, has taken over the entire business of the Ladewig-Soelch Co., Waukesha, Wis., manufacturer of bottle-washing and pasteurizing machinery for dairies and breweries, and has consolidated its production in the main Heil plant at Milwaukee.

□ □ □

Republic Coal & Coke Co. moves its offices May 1 from 28 East Jackson boulevard to Willoughby tower, Chicago. The company has been appointed exclusive sales agent for the Indiana Consumers Gas & By-Product Co. for its Terre Haute domestic and foundry coke. Lewis D. McClaren, formerly Chicago resident manager for the Indiana company, has been made manager of foundry and industrial coke sales for the Republic company.

□ □ □

General Electric Co., Schenectady, N. Y., has established at Cleveland a specialized engineering, designing and manufacturing organization under direction of Frank H. Hill as an aid to manufacturers in that area in utilization of electric heat in industrial operations. The new department is located at 4966 Woodland avenue.

□ □ □

Timken Roller Bearing Co., Canton, O., has taken an order from the Lehigh Valley for roller bearings to be used on all axles, including driving axles, of two large high-speed steam locomotives. The same road has ordered Timken roller bearings for engine trucks of five locomotives to be built by the Baldwin Locomotive Works, Philadelphia.

□ □ □

Mitchell Specialty Co., Holmesburg, Philadelphia, has installed rolling machines and is manufacturing a general line of metal moldings and shapes, straight and bent in a variety of cross sections. It is in production on a large volume of orders. A. R. Evans, formerly with the Edward C. Budd Mfg. Co., Philadelphia, is in charge of sales. The company has long manufactured automotive standard equipment, metal stampings and screw machine parts.

Production

(*Concluded from Page* 15)

ther rise. Details for districts follow:

Youngstown—Gained 3 points last week to 61 per cent, with indications pointing to a further rise to 63-64 per cent this week. Sharon Steel Hoop Co. decided to lift ingot output 20 points to 75 per cent this week, and Carnegie Steel Co. ordered a third blast furnace into action at the Ohio Works.

Buffalo—Down 2 points last week to 66 per cent as one unit scheduled for production became inactive. The 66 per cent rate will hold over for this week. Slightly higher operations are expected later in the month.

Wheeling — Unchanged at 79 per cent last week, with 30 of 39 open hearths continuing in operation.

Birmingham—Continued at 52 per cent, with 13 open hearths in operation. Despite labor troubles at mining operations, coal and ore, and at one of the furnace companies, open-hearths furnaces have been kept active.

Detroit — Unchanged at 94 per cent, with two district producers aggregating operations in 16 of the 17 open-hearth furnaces. The one inactive open-hearth furnace is down for repairs. All four blast furnaces here belonging to Hanna Furnace Co. and Ford Motor Co. are active.

Pittsburgh—Advanced 2 points to 48 per cent, with a 1-point gain scheduled for this week. Individually, steel producers are operating at rates as good or better than at any time during last summer's activity. Twenty-six of 60 steelworks blast furnaces are operating, with individual rates being as follows: Carnegie Steel Co., 10 of 32; Jones & Laughlin Steel Corp., 7 of 11; Bethlehem Steel Co., 5 of 7; and the following, 1 of 2 each: National Tube Co., at McKeesport, Pa.; American Steel & Wire Co., at Donora, Pa.; Pittsburgh Steel Co., at Monessen, Pa.; and Pittsburgh Crucible Steel Co., at Midland, Pa.

Chicago — Increased to 62½ per cent by the end of last week, a gain of 3½ points. A further small increase is anticipated for the coming week. Two corporation and one independent blast furnaces have been lighted, giving the district 14 active steelworks stacks out of 36. Two merchant units also are in blast.

Cleveland-Lorain—Held at 80 per cent, unchanged from the week preceding, though the Corrigan, McKinney Steel Co. took off one open hearth, operating 12, while Otis Steel Co. added one, operating eight. National Tube Co., Lorain, continued with 11. No change is scheduled for the current week. Otis company also lighted another blast furnace, now operating both its stacks. Plate mill operations here for the week averaged 75 per cent. The National Tube Co. has blown in its third blast furnace at Lorain.

New England—Still at 89 per cent, with this rate likely to hold this week.

Central eastern seaboard—Up 3 points to 44½ per cent, with the rate expected to increase over the next fortnight. This rate is comparable with, if not slightly in excess of, the peak for last year, reached during the summer.

¶Chapman-Price Steel Co., Indianapolis, division of the Continental Steel Corp., is resuming after being idle since last summer. It has 3 months' orders on hand, and will run 6-hour shifts.

¶American Steel & Wire Co. works at Anderson, Ind., has increased its operations from 50 per cent to 80. Welded fabric unit, making reinforcement for concrete paving, and fence departments are operating full.

ADVERTISING PAGES REMOVED

Rate 60, Best in 4 Years; Shape Awards Up

Structural Tonnage Largest in 12 Months—Rail Mills Entering Busier Period —Active Blast Furnaces Highest in Three Years—Steel Strike Threatened

WITH the largest structural steel awards in 12 months and an increase in general specifications on second quarter contracts, further strength was imparted last week to steel demand which lifted the steelworks operating rate 3 points to 60 per cent, highest since June, 1930.

Seasonal construction work came to the front vigorously, placing 41,282 tons on mill books, well distributed throughout the country, and including substantial tonnages for industrial buildings.

Although automobile production schedules this month are slightly lower than in April, so far there has been no diminution in releases from manufacturers, evidently endeavoring to accumulate stocks. Strikes in this industry are clearing up; however, the labor outlook in steel is obscured by threat of Amalgamated Association of Iron, Steel and Tin Workers to strike, and an actual walkout of 8000 iron ore miners in the South.

Bulk of Rail Tonnage Still To Be Produced; Consumers Warned of June "Scramble"

Railroad equipment builders, rail mills and track accessory manufacturers are heading into a busier period, while new buying by them, as in other directions except structurals, is negligible. Of the 700,000 tons of rails and 300,000 tons of track fastenings awarded in conjunction with the government's co-operative plan and already financed, less than 10 per cent has actually been produced, with deliveries mandatory before Aug. 31—against a national annual rail capacity of 3,500,000 tons.

Pennsylvania railroad is releasing 31,000 tons of tie plates, at the rate of 25 per cent per month. Freight car awards in April—800—give for the first four months this year a total of 20,707, largest for the comparable period since 1930.

A relatively small margin of steel that was due to be delivered on contract quotas for April was canceled by consumers. On the other hand, considerable tonnage was released too late for shipment last month, and for another week at least will be an important factor in sustaining mill operations.

The steel code prescribes that practically all the second quarter tonnage—except railroad—must be delivered before July 1, and producers are sending letters to customers warning them of this provision. In certain lines production is nearing capacity, and with a scramble for material expected in June, releases are to be taken in the order they are received.

Chicago district steelworks operations last week advanced 3½ points to 62½ per cent; Pittsburgh 2 to 48; Youngstown 3 to 61; eastern Pennsylvania 3 to 44½. Detroit was unchanged at 94; New England 89; Cleveland 80; Wheeling 79; Birmingham 52; while Buffalo was down 2 to 66. At 60 the national average now is believed to be at or near the top of the present rise.

Steel mills are taking heavy shipment of scrap, but lack of new buying and pressure of supplies again reduces STEEL's scrap composite, 30 cents to $11.70, lowest since the second week in February. Pig iron shipments continue upward. The Ford Motor Co. has acquired 50,000 tons of iron ore from a Lake Superior producer. Last year's ore prices are being quoted in the open market.

Price Adjustments Still in Progress; Germans Underbidding Domestic Steel Piling in East

Further price advances last week included $3 a ton on rail steel reinforcing bars, and iron bars. Mill quantity extras on plates and shapes are likely to be announced shortly, with changes in existing quantity extras on commercial steel bars. The recent $3 a ton increase on steel piling has been recalled at Chicago. German piling is offered about $6 a ton under the new domestic price in the East. The effect of the announced advances in steel pipe has been partially nullified by mills permitting warehouses to sell out of stock this quarter at former prices.

Daily average pig iron production in April—57,873 gross tons—was 10.3 per cent over March, and the highest since last August. Total production for April—1,736,217 tons—brought the output for the four months this year to 5,858,240 tons, 3,570,769 tons more than in the period last year. Active stacks were increased by 12 to 109, largest number in three years.

STEEL's iron and steel price composite holds at $34.77 and the finished steel index $54.80.

COMPOSITE MARKET AVERAGES

	May 5	April 28	One Month Ago April, 1934	Three Months Ago Feb., 1934	One Year Ago May, 1933	Ten Years Ago May, 1924
Iron and Steel Composite	$34.77	$34.77	$34.18	$32.42	$28.45	$41.38
Finished Steel Composite	54.80	54.80	53.90	51.10	45.10	64.93
Steelworks Scrap Composite	11.70	12.00	12.15	11.72	9.23	10.91

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	May 5, 1934	April 1934	Feb. 1934	May 1933
Finished Material				
Steel bars, Pittsburgh	1.90	1.85	1.75	1.60
Steel bars, Chicago	1.95	1.90	1.80	1.70
Steel bars Philadelphia	2.19	2.15¼	2.04	1.91
Iron bars, Terre Haute, Ind.	1.75	1.60	1.60	1.65
Shapes, Pittsburgh	1.85	1.80	1.70	1.60
Shapes, Philadelphia	2.05½	2.01¾	1.90½	1.65
Shapes, Chicago	1.90	1.85	1.75	1.70
Tank plates, Pittsburgh	1.85	1.80	1.70	1.50
Tank plates, Philadelphia	2.03½	1.99¾	1.88½	1.49½
Tank plates, Chicago	1.90	1.85	1.75	1.70
Sheets, No. 10, hot rolled, Pitts.	2.00	1.90	1.75	1.55
Sheets, No. 24, hot ann., Pitts.	2.65	2.50	2.25	2.00
Sheets, No. 24, galvan., Pitts.	3.25	3.10	2.85	2.70
Sheets, No. 10, hot rolled, Gary	2.10	2.05	1.85	1.75
Sheets, No. 24, hot anneal., Gary	2.75	2.65	2.35	2.15
Sheets, No. 24, galvan., Gary	3.35	3.25	2.95	2.80
Plain wire, Pittsburgh	2.30	2.25	2.20	2.10
Tin plate, per base box, Pitts.	5.25	5.25	5.25	4.25
Wire nails, Pittsburgh	2.60	2.50	2.35	1.85
Semifinished Material				
Sheet bars, open-hearth, Youngs.	30.00	28.40	26.00	26.00
Sheet bars, open-hearth, Pitts.	30.00	28.40	26.00	26.00
Billets, open-hearth, Pittsburgh	29.00	27.80	26.00	26.00
Wire rods, Pittsburgh	38.00	37.20	36.00	35.00

	May 5, 1934	April 1934	Feb. 1934	May 1933
Pig Iron				
Bessemer, del. Pittsburgh	19.76	19.56	19.26	16.66
Basic, Valley	18.00	17.60	17.00	14.40
Basic, eastern, del. eastern Pa.	19.76	19.51	18.76	15.44
No. 2 foundry, del. Pittsburgh	19.26	19.06	18.76	16.16
No. 2 foundry, Chicago	18.50	18.25	17.50	15.90
Southern, No. 2, Birmingham	14.50	14.25	13.50	12.00
No. 2X, Eastern, del. Philadelphia	20.63	20.38	19.63	15.95
Malleable, Valley	18.50	18.10	17.50	14.90
Malleable, Chicago	18.50	18.25	17.50	15.90
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.04
Gray forge, del. Pittsburgh	18.88	18.68	18.38	16.03
Ferromanganese, del. Pittsburgh	90.24	90.24	90.24	73.24
Scrap				
Heavy melting steel, Pittsburgh	$13.50	14.15	13.90	11.65
Heavy melting steel, eastern Pa.	11.25	11.50	11.75	9.50
Heavy melting steel, Chicago	11.50	11.75	10.90	8.70
No. 1 wrought, eastern Pa.	12.00	12.25	12.75	10.25
No. 1 wrought, Chicago	10.65	10.90	10.50	8.10
Rails for rolling, Chicago	12.50	12.75	11.90	10.25
Coke				
Connellsville, furnace, ovens	3.25	3.30	3.50	1.75
Connellsville, foundry, ovens	4.60	4.55	4.25	2.25

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	2.00c
Gary, base	2.10c
Chicago, del.	2.13c
New York, del.	2.33c
Philadelphia, del.	2.29c
Birmingham, base.	2.15c
St. Louis, del.	2.32c
*F.o.b. cars, dock, Pacific ports	2.55c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.65c
Gary, base	2.75c
Chicago, del.	2.78c
Detroit, del.	2.85c
New York, del.	2.98c
Philadelphia, del.	2.94c
Birmingham, base.	2.80c
St. Louis, del.	2.97c
*F.o.b. cars, dock, Pacific ports	3.25c

GALVANIZED No. 24

Pittsburgh, base	3.25c
Gary, base	3.35c
Chicago, del.	3.38c
Philadelphia, del.	3.54c
New York, del.	3.58c
Birmingham, base.	3.40c
St. Louis, del.	3.57c
*San Francisco, f.o.b. cars, dock	3.85c

TIN MILL BLACK No. 28

Pittsburgh, base	2.85c
Gary, base	2.95c
St. Louis, del.	3.17c

COLD ROLLED No. 10

Pittsburgh, base	2.55c
Gary, base	2.65c
Detroit, delivered	2.75c
Philadelphia, del.	2.84c
New York, del.	2.88c

COLD ROLLED No. 20

Pittsburgh, base	3.15c
Gary, base	3.25c
Detroit, delivered	3.35c
Philadelphia, del.	3.44c
New York, del.	3.48c

ENAMELING SHEETS

Pittsburgh, No. 10	2.60c
Pittsburgh, No. 20	3.20c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher

Tin plate, coke base contract	$5.25
Do., stock	4.90c
Long ternes, No. 24 unassorted	3.65c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c.

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.85c
New York, del.	2.13c
Philadelphia, del.	2.03½c
Boston, del.	2.25c
Buffalo, del.	2.08½c
Chicago, base	1.90c
Cleveland, del.	2.03½c
Birmingham, base.	2.00c
Coatesville, base	1.95c
Sparrows Pt., base.	1.95c
Pacific Coast, f.o.b. cars, dock	2.40c
St. Louis, del.	2.12c

Structural Shapes

Pittsburgh, base	1.85c
Philadelphia, del.	2.05½c
New York del.	2.10½c
Boston, del.	2.23½c
Bethlehem, base	1.95c
Chicago, base	1.90c
Cleveland, del.	2.03½c
Buffalo, base	1.90c
Birmingham, base.	2.00c
Pacific Coast, f.o.b. cars, dock	2.40c

Bars

SOFT STEEL

Pittsburgh, base	1.90c
Chicago base	1.95c
Birmingham, base.	2.05c
Buffalo, base	2.00c
Cleveland, base	1.95c
Detroit, del.	2.05c
Pacific Coast ports cars, dock, c.i.f.	2.45c
Philadelphia, del.	2.19c
Boston, del.	2.30c
New York, del.	2.23c
Pitts., forg. qual	2.05c-2.55c

RAIL STEEL
To Manufacturing Trade

*Pittsburgh	1.95c
Chicago	1.85c
Cleveland	1.85c
Gary, Ind.	1.85c
Buffalo	1.90c

IRON

*Terre Haute, Ind. base	1.75c
Philadelphia, base..	1.99c
Pittsburgh, refined..	2.75c-7.50c

REINFORCING
New billet, cut lengths, carlots

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young....	2.10c
Gulf ports	2.45c
Pacific coast ports	3.00c
Philadelphia, del.	2.34c

Rail Steel

*Pittsburgh, base	1.90c
*Chicago, Buffalo, Cleveland, Birm., Young	1.95c
*Gulf ports	2.30c
*Pacific coast ports	2.45c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland
(Per 100-lb. keg)

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
Do., 16 gage and finer..	5.10c

(Per pound)

Polished staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
*Annealed fence wire	2.45c
*Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire	3.20c

Chicago and Waukegan $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Chicago, Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Shafting □ □ □

Turned and ground, Pitts. base

1⅛-inch	3.40c
1 1/16 to 1½-inch	2.90c
1 9/16 to 1⅞-inch	2.75c
1 15/16 to 2⅞-inch	2.60c
2 15/16 to 7-inch	2.45c

Alloy Steel Bars □

Hot Rolled
Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.55c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 .15 to .25 Mo....0.50
4600 .20 to .30 Mo. 125-1.75 Ni. 1.05
5100 .80-1.10 Cr. 0.45
5100 Cr. spring ....base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon van. 0.95
9250.....carbon base plus extras

Strip and Hoops □

Hot strip to 23¾-in.

Pittsburgh	2.00c
Do., Chicago	2.10c
Do., del. Detroit..	2.20c
Do., del. Phila.	2.29c
Do., del. N. Y.	2.33c
Cooperage hoop, Pittsburgh	2.10c
Do., Chicago	2.20c
Cold-rolled strip, Pitts., Cleve.	2.80c
Worcester	3.00c

Rails, Track Material □

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
24-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$18.00
80-85 lbs.	$25.00
100 lbs.	$26.00
Light rails, billet qual., Pitts., Chi..	$35.00
Do., reroll. qual...	$34.00
Angle bars, mills....	2.55c
Spikes, R. R. base..	2.40c
Track bolts, base....	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70 off
Rolled thread, ½ x 6 and smaller	70 off

MACHINE BOLTS

All sizes, cut thread, lag Screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts, without nuts ....70 off
Tire bolts ....60 off
Stove bolts, 70-25-10 off in pkgs.; 83 off in bulk, 5000 or more of a size.
Rolled thread machine bolts, ½ x 6 and smaller, 70 off
Step bolts ....66 off
Elevator bolts ....66 off

NUTS

Semifinished ....70 off

HEXAGON CAP SCREWS

Milled ....80-10-10 off
Upset 1-in., smaller ....85 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller....75-10 off
Upset, larger than 1-in.... ....75-10 off
Headless set screws ....75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	3.00c
Struc., c. l., Chicago	3.10c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila..	6.25 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more, no discount on size extras	$3.05
Do. less than 5 kegs; no discount on size extras	$3.20
*Steel piling, Pittsburgh..	2.00c
*Steel piling, Chi., Buff....	2.10c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD
Steel

In.	Blk.	Gal.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD
Steel

2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½

LINE PIPE
Steel

⅛-inch, butt weld	50½
¼—⅜, buttweld	52½
½, butt weld	57½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½-inch, black and galv. take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra.

BOILER TUBES
C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¾—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES
Cold Drawn

2—2¼	27	3¼—3½	41
2½—2¾	34	4	43
3	38	4½, 5, 6	36

(On 1—1¾-inch sizes mechanical tubing dis. apply.)
Hot Rolled

2—2¼	33	3¼—3½	47
2½—2¾	40	4	49
3	44	4½, 5, 6	42

Quantity discounts: Carload and more gets preferentials of two 5%; 2000 to 999 pounds, 10 points off base and one 5%, under 2000 pounds, 15 points under base and one 5%.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$36.00-37.00
4-in., Birmingham..	39.00-40.00
4-in., Chicago	47.00-48.00
6 to 24-in., Chicago	44.00-45.00
6-in., & over, east. fdy.	40.00
Do., 4-in.	43.00

Class A pipe $3 over Class B.

Stnd. fitgs., Birm. base	$90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

Semifinished Steel □

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4-inch base

Pitts., Chi., Cleve., and Youngstown..	$29.00
Philadelphia	34.30
Forging, Pitts., Chi. and Buffalo	34.00

SHEET BARS

Pitts., Cleve., Young., Chi., Buff., Canton, O.	30.00

SLABS

Pitts., Cleve., Young.	29.00

WIRE RODS

Pitts., Cleveland	38.00
Chicago	39.00

SKELP

All grades, Pitts. and Chicago	1.70c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur†	$3.25- 3.85
Connellsville fdry.	4.60
Connell. prem. fdy.	5.35
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

†Lower prices for yearly contracts.

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi., ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	10.50
St. Louis, del.	9.25
Birmingham, ovens	5.50
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.50
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.
Tank lots

	Spot
Pure benzol	$0.19
90 per cent benzol	$0.19
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26

Per lb. f.o.b. New York

Phenol (200 lb. drums)..	0.163c
Do. (100 lbs.)	0.173c

Eastern Plants, Per Pound, In Barrels

†Naphthalene flakes and balls	6.00

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.25

†Western prices ½-cent up.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25. Gross tons.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	.....	19.00	.....
From Swedeland, Pa., del. to Phila.	20.26	20.76	19.76	.....
From Bethlehem, del. to Brooklyn	21.77	22.27	.....	.....
From Bethlehem, del. to Newark, N. J.	20.99	21.39	.....	.....
Basing Point:				
Everett, Mass.	19.50	20.00	19.00	20.50
From Everett, del. to Boston	20.00	20.50	19.50	21.00
Basing Point:				
Buffalo	18.50	19.00	17.50	18.50
From Buffalo, del. to Boston	20.00	20.50	19.50	21.00
Basing Points:				
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
From Neville Island, Pa., del. to Pittsburgh district	(Neville Island base, plus 63c to $1.13 switching charges)			
Basing Points:				
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, O.	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
From Detroit, del. to Saginaw, Mich.	20.60	20.60	20.10	21.10
From Cleveland, del. to Akron, Canton, O.	19.76	19.76	19.26	20.26
From Toledo, del. to Mansfield, O.	20.26	20.26	19.76	20.76
Basing Point:				
Jackson, O.	20.25	20.25	19.75	.....
Hamilton, O.	18.50	18.50	18.00	.....
From Hamilton, del. to Cincinnati	19.51	19.51	19.01	20.01
Do., del. to Indianapolis	20.77	20.77	20.27	21.27
Basing Points:				
Duluth	19.00	19.00	.....	19.50
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	19.00	18.00	.....
From Duluth, del. to St. Paul	20.94	20.94	.....	21.44
From Chicago, del. to Milwaukee	19.50	19.50	19.00	20.00
From Chicago, Toledo or Detroit, del. to Muskegon, Mich.	21.40	21.40	20.90	21.90
From Granite City, del. to St. Louis	19.00	19.50	18.50	.....
Basing Point:				
†Birmingham, Ala.	14.50	.....	13.50	19.00
From Birmingham, del. to:				
Boston	19.62	.....	19.50	.....
Newark, N. J.	20.58	.....	.....	.....
Brooklyn, N. Y.	21.39	.....	.....	.....
Baltimore	20.02	.....	19.90	.....
Philadelphia	19.88	.....	19.76	.....
Cleveland	18.62	.....	18.50	.....
Cincinnati	19.13	.....	18.51	.....
Chicago	††18.72	.....	18.60	.....
St. Louis	18.62	.....	18.50	.....

†Southern delivery only. Prices at northern points are adjusted to quotations on northern iron. ††Over 0.70 phos.

Basing Point:				
Provo, Utah	17.50	.....	17.00	.....

LOW PHOS.

Basing Points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.50. Basing Point: †Johnson City, Tenn.—$23.50

†Off grade material is $19.50

*Philadelphia, standard and copper bearing 24.63

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	*Lake Superior fur.	21.00
Pitts. dist. fur.	17.75	*Do., del. Chicago	24.04

SILVERY

*Jackson County, O., base; 6%—$22.75; 7—$23.75; 8—$24.75; 9—$25.75; 10—$26.75; 11—$27.75.

BESSEMER FERROSILICON

*Jackson County, O., base; 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Iron Ore □ □

LAKE SUPERIOR ORE
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

EASTERN LOCAL ORES
Cents, unit, del. E. Pa.

Foundry and basic, 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

FOREIGN ORE
Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%.	9.00
Tungsten, spot, sh. ton unit, duty pd.	$17.25-17.75
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00

Manganese Ore □

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	24.00
So. African, 52%	24.00
So. Afr., 49-51%	22.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories □ □

Per 1000 f.o.b. Works

FIRE CLAY BRICK
First Quality

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00
Second Quality	
Pa., Ill., Ky., Md., Mo., Ga., Ala.	40.00
Ohio	
First quality	$40.00
Intermediary	36.00
Second quality	25.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

BASIC BRICK
Net ton, f.o.b. Baltimore, Plymouth, Meeting, Pa., Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemically bonded magnesite	55.00

Fluorspar, 85-5 □ □

Washed gravel, duty paid, tide, net ton	$19.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$17.00

Ferroalloys □ □

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
del. Pittsburgh	90.24
Spiegeleisen, 19-20%, dom. fur. spot†	26.00
Ferrosilicon 50%, freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent. Spot, $5 a ton higher.	126-130.00
Silicomang., 2½ carb.	90.00
2% carbon	95.00
1% carbon	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19%, Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 8.50c Conn. copper

Sheets	
Yellow brass (high)	14.25
Copper, hot rolled	15.50
Lead, cut, to jobbers	8.00
Zinc, 100-lb. base	9.00
Tubes and Pipes	
High yellow brass	16.75
Seamless copper	16.75
Rods	
High yellow brass	12.75
Copper, hot rolled	12.75
Anodes	
Copper untrimmed	13.25
Wire	
Yellow brass (high)	14.75

Old Metals □ □

Deal, buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.87½-5.12½
Chicago	5.12½-5.37½
Cleveland	5.50- 6.00
*St. Louis	5.00- 5.25
Heavy Copper and Wire	
New York	6.50- 6.62½
Chicago No. 1	6.37½-6.62½
Cleveland	6.25- 6.75
*St. Louis	6.00- 6.25
Composition Brass Borings	
New York	4.62½-4.87½
Light Copper	
New York	5.62½-5.87½
Chicago	5.12½-5.37½
Cleveland	5.50- 6.00
*St. Louis	5.25- 5.50
Light Brass	
Chicago	3.12½-3.37½
Cleveland	3.25- 3.50
Lead	
New York	3.12½-3.37½
Cleveland	3.25- 3.50
Chicago	3.00- 3.25
St. Louis	3.35- 3.50
Zinc	
New York	2.25- 2.50
Cleveland	2.25- 2.75
St. Louis	2.75-3.00
Aluminum	
Clips, soft, Cleve.	13.00-14.50
Borings, Cleveland	7.00- 7.50
Mixed, cast, Cleve.	11.00-11.25
Mixed, cast, St. L.	11.75-12.00

Secondary Metals □

Brass ingot, 85-5-5-5	8.75
Remelt al. No. 12	14.50-16.00

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	11.50-12.50
Boston, dealers	7.50- 7.75
Buffalo, No. 1	12.00-13.00
Buffalo, No. 2	10.50-11.50
Chicago, No. 1	11.25-11.75
Cleveland, No. 1	11.50-12.00
Cleveland, No. 2	11.00-11.50
Detroit, No. 1	9.00- 9.50
Detroit, No. 2	8.00- 8.50
Eastern Pa.	11.00-11.50
Eastern Pa., No. 2	9.00- 9.50
Federal, Ill.	8.50- 9.00
Granite City, R. R.	8.50- 9.00
Granite City, No. 2	7.50- 8.00
N. Y., deal. R. R.	9.00
N. Y., deal. No. 2	7.50
Pittsburgh, No. 1	13.25-13.75
Valleys, No. 1	14.00

COMPRESSED SHEETS

Buffalo, dealers	10.50-11.50
Chicago, factory	10.25-10.75
Cleveland	11.00-11.50
Detroit	9.00- 9.50
E. Pa., new mat.	10.50-11.00
Pittsburgh	12.75-13.25
St. Louis	8.50- 9.00
Valleys	13.50

BUNDLED SHEETS

Buffalo	7.50- 8.00
Cincinnati, del.	7.50- 8.00
Cleveland	8.50- 9.00
Pittsburgh	11.75-12.25
St. Louis	5.50- 6.00

SHEET CLIPPINGS LOOSE

Chicago	6.25- 6.75
Cincinnati	7.00- 7.50
Detroit	5.50- 6.00
St. Louis	5.75- 6.25

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Boston, dealers	7.25- 7.50
Buffalo	14.00-14.50
Chicago (3 ft.)	12.00-12.50
Chicago (2 ft.)	12.50-13.00
Cincinnati, del.	12.50-13.00
Detroit	11.50-12.00
Pitts., open-hearth, 3 ft. and less	15.75-16.25
St. Louis, 2 ft. & less	13.00-13.50

STEEL RAILS, SCRAP

Pittsburgh	13.25-13.75

STOVE PLATE

Birmingham	7.00- 7.50
Boston, dealers	4.75- 5.00
Buffalo	10.75-11.00
Chicago, net	7.50- 8.00
Cincinnati, dealers	6.50- 7.00
Detroit, net	7.50- 8.00
Eastern Pa.	8.50- 9.00
N. Y., deal. fdry.	6.00
St. Louis	6.75- 7.25

COUPLERS, SPRINGS

Buffalo	13.75-14.25
Chicago, springs	12.50-13.00
Eastern Pa.	15.50
Pittsburgh	15.75-16.25
St. Louis	9.00- 9.50

ANGLE BARS—STEEL

Chicago	12.00-12.50
St. Louis	9.50-10.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	14.00-14.50
Cleveland, billet, bloom crops	14.00-14.50
Eastern Pa. crops	15.00-15.50
Pittsburgh, billet, bloom crops	16.25-16.75
Pittsburgh, sheet bar crops	15.25-15.75

FROGS, SWITCHES

Chicago	11.25-11.75
St. Louis, cut	9.00- 9.50

SHOVELING STEEL

Chicago	11.25-11.75
Federal, Ill.	7.75- 8.25
Granite City, Ill.	7.50- 8.00

RAILROAD WROUGHT

Birmingham	6.50- 7.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	9.50-10.00
Buffalo, No. 2	12.50-13.00
Chicago, No. 1 net	9.25- 9.75
Chicago, No. 2	11.25-11.75
Cincinnati, No. 2	9.00- 9.50
Eastern Pa.	12.00
N. Y., No. 1 deal.	8.50- 9.00
St. Louis, No. 1	6.50- 7.00
St. Louis, No. 2	8.75- 9.25

SPECIFICATION PIPE

Boston	4.50- 4.75
Eastern Pa.	9.00
New York, dealers	5.25- 5.50

BUSHELING

Buffalo, No. 1	10.50-11.50
Chicago, No. 1	10.25-10.50
Cinci., No. 1 deal.	7.00- 7.50
Cincinnati, No. 2	4.75- 5.25
Cleveland, No. 2	8.75- 9.25
Detroit, No. 1 new	8.50- 9.00
Valleys, new No. 1	13.50

MACHINE TURNINGS

Birmingham	4.50- 5.00
Boston, dealers	3.50- 3.75
Buffalo	6.25- 6.50
Chicago	7.00- 7.50
Cincinnati, dealers	6.00- 6.50
Cleveland	8.75- 9.25
Detroit	6.00- 6.50
Eastern Pa.	7.50
New York, dealers	3.25- 3.50
Pittsburgh	8.50- 9.00
St. Louis	4.25- 4.75
Valleys	11.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	7.75- 8.25
Cincinnati, dealers	5.50- 6.00
Cleveland	8.75- 9.25
Detroit	6.75- 7.25
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.50
Pittsburgh	8.25- 8.75

CAST IRON BORINGS

Birmingham, plain	4.50- 5.00
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	7.50- 8.00
Chicago	7.25- 7.75
Cincinnati, dealers	5.50- 6.00
Cleveland	8.75- 9.25
Detroit	6.75- 7.25
E. Pa., chemical	12.00-15.00
New York, dealers	3.00- 3.50
Pittsburgh	8.25- 8.75
St. Louis	4.75- 5.25

PIPE AND FLUES

Cincinnati, dealers	4.75- 5.25

RAILROAD GRATE BARS

Buffalo	7.00- 7.50
Chicago, net	7.25- 7.75
Cincinnati	6.00- 6.50
Eastern Pa.	9.00
New York, dealers	5.00- 5.50
St. Louis	6.00- 6.50

FORGE FLASHINGS

Boston, dealers	5.25- 5.50
Buffalo	11.00-11.50
Cleve., over 10 in.	9.25- 9.75
Detroit	8.00- 8.50

FORGE SCRAP

Boston, dealers	5.25- 5.50
Chicago, heavy	12.00-12.50
Eastern Pa.	10.50-11.00

ARCH BARS, TRANSOMS

St. Louis	11.00-11.50

AXLE TURNINGS

Boston, dealers	4.50- 5.00
Buffalo	9.00- 9.50
Chicago, elec. fur.	10.50-11.00
Cleveland	9.25- 9.75
Eastern Pa.	11.00
St. Louis	7.50- 8.00

STEEL CAR AXLES

Birmingham	10.00-11.00
Boston, ship, point.	9.00- 9.50
Buffalo	13.00 13.50
Chicago, net	11.75-12.25
Eastern Pa.	14.00
St. Louis	9.50-10.00

SHAFTING

Boston, ship, point.	11.00-11.25
Eastern Pa.	16.00
New York, dealers	11.50-12.00
St. Louis	13.00-13.50

CAR WHEELS

Birmingham, iron	9.50-10.00
Boston, iron deal.	6.50- 6.75
Buffalo, iron	12.25-12.75
Buffalo, steel	13.75-14.25
Chicago, iron	12.00-12.50
Chicago, rolled steel	12.00-12.50
Cincinnati, iron	9.75-10.25
Eastern Pa., iron	12.50-13.00
Eastern Pa., steel	14.00-15.00
Pittsburgh, iron	12.25-12.75
Pittsburgh, steel	15.75-16.25
St. Louis, iron	9.00- 9.50
St. Louis, steel	9.00- 9.50

NO. 1 CAST SCRAP

Birmingham	9.00-10.00
Boston, No. 2	5.50- 6.00
Boston, tex. con.	10.50-11.00
Buffalo, cupola	10.50-11.50
Buffalo, mach.	12.00-12.50
Chicago, agri. net	8.00- 8.50
Chicago, mach. net	9.00- 9.50
Chi., railroad net	8.75- 9.25
Cinci., mach. cup	10.25-10.75
Cleveland, cupola	13.00-13.50
Detroit, net	9.50-10.00
Eastern Pa., cupola	12.50-13.00
Pittsburgh, cupola	12.50-13.00
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.25- 8.75
St. L., No. 1 mach.	10.00-10.50

HEAVY CAST

Boston, del.	6.75- 7.00
Buffalo, break.	9.00- 9.50
Cleveland, break.	8.50- 9.00
Detroit, break.	8.00- 8.50
Detroit, auto net	11.00-11.50
Eastern Pa.	11.50-12.00
N. Y., No. 1, deal.	7.50- 8.00
N. Y., break. deal.	7.50- 8.00
Pittsburgh	11.50-12.00

MALLEABLE

Boston, consum.	12.50-13.00
Buffalo	13.25-13.75
Chicago, R. R.	12.00-12.50
Cincinnati, agri. del.	9.75-10.25
Cinci., R. R. del.	10.50-11.00
Cleveland, rail.	13.50-14.00
Detroit, auto	9.75-10.25
St. Louis, R. R.	10.00-10.50
Eastern Pa., R. R.	11.50-12.00

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.50
Boston, dealers	7.50- 7.75
Buffalo	12.00-12.50
Chicago	12.25-12.75
Eastern Pa.	13.00
New York, dealer	8.00- 8.50
St. Louis	10.00-10.50

LOCOMOTIVE TIRES

Chicago (cut)	12.00-12.50
St. Louis, No. 1	9.75-10.25

LOW. PHOS. PUNCHINGS

Buffalo	13.75-14.25
Chicago	12.00-12.50
Eastern Pa.	14.50-15.00
Pittsburgh	15.00-15.50

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Nickel Ingot
April 28	8.50	8.62½	8.25	55.12½	55.15	4.25	4.10	4.40	*22.90	7.95	36.00
April 30	8.50	8.62½	8.25	55.25	55.22½	4.25	4.10	4.40	*22.90	7.95	36.00
May 1	8.50	8.62½	8.25	54.50	54.55	4.25	4.10	4.40	*22.90	8.00	36.00
May 2	8.50	8.62½	8.25	54.60	54.65	4.25	4.10	4.40	*22.90	8.50	36.00
May 3	8.50	8.62½	8.25	54.00	54.05	4.25	4.10	4.40	*22.90	8.60	36.00
May 4	8.50	8.62½	8.25	53.90	53.95	4.25	4.10	4.35	*22.90	8.60	36.00

*Nominal range 19.00c to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	
Baltimore*	2.75c
Boston††	3.05c
Buffalo	2.95c
Chattanooga	3.41c
Chicago	3.05c
Cincinnati	3.25c
Cleveland	3.05c
Detroit	3.13½c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.00c
New York‡(d)	3.32c
Pittsburgh(h)	3.00c
Philadelphia*	3.00c
San Francisco	3.60c
Seattle	3.40c
St. Louis	3.29c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	
Portland	3.40c
Baltimore*	2.60c
Chattanooga	3.41c
Chicago	2.75c
Cincinnati	3.25c
New York‡(d)	3.32c
Philadelphia*	3.00c
St. Louis	3.29c
Tulsa	3.25c

REINFORC. BARS	
Buffalo	1.95c
Chattanooga	3.41c
Chicago	2.10c-2.60c
Cleveland (c)	1.97½c
Cincinnati	3.10c
Houston	3.25c
Los Ang., cl.	2.15c
New Orleans	3.00c
Pitts., plain(h)	3.15c
Pitts., twisted squares (h)	3.27½c
San Francisco	2.45c
Seattle	2.65c
St. Louis	3.44c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES	
Baltimore*	2.75c
Boston††	3.22c
Buffalo	3.20c
Chattanooga	3.61c
Chicago	3.25c
Cincinnati	3.45c
Cleveland	3.36c
Detroit	3.45c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.50c
New York(d)	3.42c
Philadelphia*	3.00c
Pittsburgh(h)	3.20c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.49c
St. Paul	3.25c
Tulsa	3.50c

PLATES	
Baltimore*	2.75c
Boston††	3.23c
Buffalo	3.20c
Chattanooga	3.61c
Chicago	3.25c
Cincinnati	3.45c
Cleveland, ¼-in. and over	3.36c
Detroit	3.30c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.50c
New York(d)	3.45c
Philadelphia*	3.00c
Phila. floor	5.00c
Pittsburgh(h)	3.20c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.49c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	
Baltimore*	2.95c
Boston††	3.40c
Buffalo	3.10c
Chattanooga	3.51c
Chicago	3.20c
Cincinnati	3.35c
Cleveland	3.26c
Det., 8-10 ga.	3.28½
Houston	3.35c
Los Angeles	3.80c
New Orleans	3.50c
New York	3.42c
Portland	3.75c
Philadelphia*	3.20c
Pittsburgh(h)	3.10c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.44c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	
Baltimore*†	3.76c
Boston (g)	4.15c
Buffalo	3.25c
Chattanooga	4.41c
Chicago	4.10c
Cincinnati	3.85c
Cleveland	3.76c
Detroit	4.185c
Los Angeles	4.35c
New York	4.05c
Philadelphia*†	3.80c
Pittsburgh**	3.80c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	3.94c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS‡	
Baltimore*†	4.36c
Buffalo	4.00c
Boston (g)	4.75c
Chattanooga	5.01c
Chicago (h)	4.70c
Cincinnati	4.45c
Cleveland	4.36c
Detroit	4.85c
Houston	4.40c
Los Angeles	5.05c
New Orleans	4.35c
New York	4.25c
Pitts.** (h)	4.30-4.60c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.54c
St. Paul	4.19c
Tulsa	5.10c
Philadelphia*†	4.40c

BANDS	
Baltimore	3.05c
Boston††	3.40c
Buffalo	3.30c
Chattanooga	3.76c
Chicago	3.45c
Cincinnati	3.60c
Cleveland	3.51c
Detroit, ⅜-in. and lighter	3.53½c
Houston	3.25c
Los Angeles	3.90c
New Orleans	3.20c
New York(d)	3.77c
Philadelphia	3.30c
Pittsburgh(h)	3.85c
Portland	3.90c
San Francisco	4.05c
Seattle	3.90c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.69c

HOOPS	
Baltimore	2.80c
Boston	4.40c
Buffalo	3.55c
Chicago	3.45c
Cincinnati	3.60c
Det., No. 14 and lighter	3.53½c
New York	3.77c
Philadelphia	3.55c
Pittsburgh(h)	3.85c
Seattle	5.40c
St. Paul	3.75c

COLD FIN. STEEL	
Baltimore (c)	3.71c
Boston	4.00c-4.50c
Buffalo (h)	3.55c
Chattanooga*	4.06c
Chicago (h)	3.50c
Cincinnati	3.70c
Cleveland (h)	3.50c
Detroit	3.63½c
Los Ang.(f)(d)	5.95c
New Orleans	4.25c
New York	3.92c-4.42c
Philadelphia	3.73c
Pittsburgh(h)	3.45c
Portland (f)	4.75c
San Fran.(f)(d)	5.95c
Seattle (f)(d)	4.75c
St. Paul	3.20c
St. Louis	3.74c
Tulsa	4.65c

COLD ROLL. STRIP	
Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	5.25c
Chicago (b)	3.45c
Cincinnati	5 80c
Cleveland (b)	3.20c
Detroit	5.40c
Philadelphia	4.00c
New York	4.70c
St. Louis	5.74c

(b) Plus straightening, cutting and quantity differentials.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, May 3

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665 £ s d	
PIG IRON				
Foundry, 2.50-3.00 Silicon	$15.39	3 0 0	$8.03	1 13 0
Basic bessemer	13.85	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05	16.03	3 2 6	....	.....
SEMIFINISHED STEEL				
Billets	$28.22	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage	40.01	7 16 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$39.76	7 15 0	$26.77	5 10 0
Merchant bars	1.72c	7 10 0	.69c to .72c	3 2 6 to 3 5 0
Structural shapes	1.69c	7 7 6	.63c to .66c	2 17 6 to 3 0 0
Plates, †¼ in. or 5 mm.	1.83c	8 0 0	.91c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.12c	9 5 0	1.24c to 1.27c	5 12 6 to 5 15 0
Sheets, gal., 24 gage, corr.	2.58c	11 5 0	1.43c	6 10 0
Bands and strips	1.89c	8 5 0	.88c	4 0 0
Plain wire, base	2.23c	9 15 0	1.18c	5 7 6
Galvanized wire, base	2.63c	11 10 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.75c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs.	$ 4.23	0 16 6	....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d 4($3.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$17.31	3 7 6(a)	$12.60	190	$13.87	295	$24.95	63
Basic bessemer pig iron	16.67	3 5 0(a)*	12.27	185	13.63	290	27.52	(b)69.50
Furnace coke	4.49	0 17 6	7.96	120	5.17	110	7.62	19.25
Billets	28.22	5 10 0	28.51	430	20.68	440	38.21	96.50
Standard rails	1.89c	8 5 0	2.10c	700	2.31c	1,100	2.38c	132
Merchant bars	1.97c	8 12 0	1.68c	560	1.16c	550	1.98c	110
Structural shapes	2.00c	8 15 0	1.65c	550	1.16c	550	1.94c	107.50
Plates, †¼-in. or 5 mm.	2.03c	8 17 6	2.10c	700	1.47c	700	2.29c	127
Sheets, black	2.35c	10 5 0§	2.55c	850‡	1.63c	775‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.92c	12 15 0	4.50c	1,500	3.15c	1,500	6.66c	370
Plain wire	2.23c	9 15 0	3.39c	1,130	2.31c	1,100	3.11c	173
Bands and strips	2.40c	10 10 0	1.95c	650	1.47c	700	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. (a) del. Middlesbrough. (b) hematite

Bars

Bar Prices, Page 64

Pittsburgh — Specifying against lower-priced contracts than the present spot market on merchant steel and alloy steel bars still is heavy and bar shipments are moving in normal proportions to nonintegrated cold bar drawers, automotive parts manufacturers and several railroad car shops. Demand for silico-manganese bars is well sustained and in order to fill additional orders for one automobile concern a district bar mill has temporarily taken on additional silico-manganese cold-finishishing capacity.

Cleveland—Bar mill shipments in April were the largest of any month since 1930. May specifications already in hand indicate further improvement, while producers expect a scramble in June, with shipments approximating the heaviest months of 1929. While automotive requirements predominate, more material is moving to agricultural implement and road builders than to railroads, from this district. Nut and bolt manufacturers also are specifying liberally. Producers view as one of the most encouraging features in the market the widely distributed miscellaneous demand.

Chicago—Steel bar specifications are heavier and shipments are in the largest volume for the year. Activity reflects steady consumption by automotive, farm implement and miscellaneous industries as well as necessity for moving the large tonnages booked recently for delivery this quarter. Cold bar finishers are taking heavy shipments. Iron bars have been advanced $3 a ton, equaling the increase on soft steel bars. Common iron bars now are 1.75c, Terre Haute, Ind., with merchant iron 2.00c and refined iron 2.25c, Terre Haute, Ind.

Boston—Commercial steel bar shipments continue fairly active also forging and alloy bars. Demand is fairly general.

New York—Changes in existing quantity extras on steel bars are reported impending. It is believed these will apply to delivery at one time to one destination with bars of one size. All differentials are planned to be on the basis of 100 pounds, which would mean elimination of present lump extras on bars.

Philadelphia—Steel bar specifications show further slight expansion with little new business to take the recent advance of $3 a ton. A revision in quantity extras on steel bars to conform somewhat with those tentatively proposed for shapes and plates is considered likely soon. Current market on soft steel bars is 2.19c, delivered, Philadelphia, and on common iron bars, 1.99c, Philadelphia.

Plates

Plate Prices, Page 64

Pittsburgh—The river barge market is quiet. Most tank work is of small size individually. Plates hold steady at 1.85c, Pittsburgh, except where protections have been granted at the former 1.70c base.

Cleveland—Plate mills here operated at 75 per cent last week, highest this year. A good run of miscellaneous orders from a wide area, with additional railroad releases, are noted. Practically all plate fabricattors are doing better than earlier in the year.

Chicago—Inquiries for fabricated plate projects are less active and orders also are light. Plate shipments to railroads and car builders continue to increase. Construction of municipal water tanks still is slow with little increase in commencement of PWA projects involving tank work. Piling is being restored to the 2.10c, Chicago, price, effective May 12. This quotation was advanced a short time ago to 2.25c.

Boston—several hundred tons of plates have been placed by the Worcester, Mass., carbuilder for coaches for New Haven, New York & New Haven with a Pittsburgh district mill. Substantial volume is required for gas holders.

New York—Specifications for steel plates are expanding but formal contracts for railroad equipment recently have been delayed. Prospective changes in quantity extras are reported imminent, applying to one delivery at one time on one thickness of plates, with differentials on basis of 100 pounds.

Philadelphia—While plate buying is relatively light, specifications continue to expand with eastern producers increasing operations. Miscellaneous tank work is a feature of present releases, although railroad tonnage continues an important factor. Plates are 2.03½c, delivered, Philadelphia.

Contracts Placed

218 tons, 24 to 48-inch corrugated metal pipe, United States bureau public roads, Mohave county, California; to unnamed interest.

130 tons, 500,000-gallon standpipe, Albemarle, N. C., to Chicago Bridge & Iron Works, $13,651.

Contracts Pending

4350 tons, plate steel penstock pipe, Grand Coulee dam, Columbia river basin project, construction bids June 18, bureau of reclamation, Spokane, Wash.; government to purchase material.

2500 tons, liner plates, metropolitan water district, Los Angeles; bids opened.

759 tons, 50 steel pontoons each weighing 11 tons, and 150 pieces of welded pipe weighing 209 tons, Louisville, Ky., engineers; bids May 10.

400 tons, municipal water tower, Dallas, Tex.; Pittsburgh-Des Moines Steel Co., Pittsburgh, low.

290 tons, 22-inch, 14-gage pipe, metropolitan water district, Los Angeles; bids opened.

270 tons, tanks, Crown Central Petroleum Co., Houston, Tex., to Wyatt Boiler Works, Dallas, Tex.

196 tons for West Coast, bids May 15 under navy Schedule 2340.

156 tons for Norfolk navy yard; bids May 2 under Requisition 735.

150 tons, 500,000-gallon steel standpipe, Goshen, N. Y.; bids in.

115 tons, two 10,000-barrel tanks, Pan American Petroleum & Transport Co., South Portland, Me., to Chicago Bridge & Iron Works, Chicago.

Unstated tonnage, one 176 x 38 x 8½-foot towboat, Vicksburg, Miss., engineers; bids May 29.

Sheets

Sheet Prices, Page 64

Pittsburgh—With a large part of present orders specified for immediate delivery, some pressure on mills is expected soon. This situation is complicated by the time required for processing full-finished sheets. New prices have not yet been fully tested.

Cleveland—April sheet tonnage was not fully specified, practically all sellers here noting that consumers permitted some material to lapse, though the amount was relatively small. In some instances where producers in their contracts required that May specifications be in hand by April 15 the contract tonnage for May was not entirely specified. Shipments to leading consumers continue heavy and mill operations here have increased. The Fisher Body Co.'s plant here has resumed after a strike, and again is taking material.

Chicago—Sheet specifications have increased following a brief period of lagging demand. Automotive deliveries continue heavy, and benefit from the ending of recent body plant strikes.

Philadelphia — Sheet consumers are responding fairly well to the urgent pleas of producers for specifications, that shipping complications

may be reduced as much as possible in June. The state of Pennsylvania is expected momentarily to award 500 tons of license tag stock. Virginia has closed on several hundred tons of stock with the Richmond Hardware Co., Richmond, Va.

Boston—Sheet specifications are improving slowly. Car builders, railroad shops, small tank business and jobbers account for a good part of the current volume.

New York—Sheet releases are coming in fairly satisfactory volume, sellers report. Virtually all consumers are covered at the old prices.

Washington—The navy department will open bids May 11, under schedule 380 on 218 tons of galvanized steel sheets for stock at Norfolk, Va., navy yard.

Buffalo—Sheet mills here continue to operate at 85 to 90 per cent, with backlogs sufficient to continue on this basis throughout May.

Cincinnati—Releases by manufacturers of household specialties are heavy. Mills are urging early specifications to avoid congestion in the latter part of the quarter.

St. Louis—The past week developed a decided improvement in demand for sheets of all descriptions. Galvanized sheets, particularly corrugated roofing varieties, are moving in larger volume. Manufacturers of silos are ordering considerable tonnage.

Birmingham, Ala.—Production of sheets is steady, with shipments almost equal to output.

Railroads

Track Material Prices, Page 65

Present railroad participation in the steel market consists largely of placing track accessories. The Pennsylvania is releasing 31,000 tons of tie plates bought last fall, at the rate of 25 per cent a month. PWA approval of a loan of $2,100,000 to the New York Central for rails and fastenings reveals distribution of the latter. Jones & Laughlin Steel Corp., Pittsburgh, was awarded a large order, Youngstown Sheet & Tube Co., Youngstown, O., will supply 332,600 tie plates and 1900 kegs of spikes, Republic Steel Corp., Youngstown, O., 75,000 tie plates and 3000 kegs of track bolts, Weirton Steel Co., Weirton, W. Va., about the same as Republic's order. Frog and switch orders went to Lorain Steel Co., Johnstown, Pa., and Cleveland Frog & Crossing Co., Cleveland.

Fruit Growers' Express, Washington, is releasing steel for its car repair work at Indiana Harbor, Ind., and Alexandria, Va.

Court permission has been given trustees of the Missouri Pacific to install automobile loaders in 300 box cars at cost of $133,800.

Domestic freight car awards in April involved 800 cars, of which 500 were for the Delaware, Lackawanna & Western and 250 for the Gulf, Mobile & Northern, which also will build 100 in its own shops. The total for the first four months is 20,707, compared with 58 in the corresponding period of last year, 299 in the first four months of 1932 and 51.15 in the same period of 1931. Further comparisons follow:

	1934	1933	1932	1931
Jan.	152	3	159	100
Feb.	19,725	0	35	50
March	30	5	105	2,166
April	800	50	0	2,798
4 mo.	20,707	58	299	5,115
May	.....	8	60	20
June	.....	500	0	1,910
July	.....	306	25	617
Aug.	.....	202	5	1,304
Sept.	.....	23	1,298	703
Oct.	.....	514	0	980
Nov.	.....	533	2	35
Dec.	.....	316	50	11
Total	.....	2,460	1,739	10,694

Car Orders Placed

Navy, Washington, three flats and two box cars, each 50 tons capacity to Haffner-Thrall Car Co., Chicago.

Locomotives Placed

Brooklyn navy yard, fireless switching locomotive and charging station, to H. K. Porter Co., Pittsburgh, Pa.

Chief of engineers, supplies, Washington, one 18-ton gasoline-mechanical locomotive, to Vulcan Iron Works, Wilkesbarre, Pa.

Locomotives Pending

Lehigh Valley, 5 steam locomotive; PWA loan of $600,000 allotted.

Midland Continental, one diesel-electric locomotive to cost $52,000; PWA loan of $36,000 allotted.

Strip Steel

Strip Prices, Page 65

Pittsburgh—Most strip steel shipments are at the old 1.70c base on hot-rolled and 2.40c base on cold-rolled. However, on spot tonnage advanced prices of 2.00c on hot-rolled and 2.80c on cold-rolled, both Pittsburgh bases, are quoted. Strip buyers, knowing that these prices become effective beginning with third quarter, are calculating June specifications to be certain their orders are not carried over into third quarter.

Cleveland—Mill schedules have been improved and steadied by liberal specifications for production this month. Automotive shipments are holding up. Some manufacturers of residential hardware are ordering material for the first time in many months. Cooperage stock also is in better demand.

Chicago—Strip specifications are heavier and production shows moderate gains. Some difficulty is expected in completing delivery of material booked before recent price advances and a maintenance of recent operations appears assured for two months. Automotive requirements are holding well. New business is light with the market 2.10c, Chicago, for hot strip and 2.80c, Cleveland, for cold-rolled.

Boston—Some cold strip mills are stocking moderately in anticipation of heavy shipping orders against contracts late this quarter. Meanwhile specifications hold well for both cold and hot-rolled, the former being 3.00c, Worcester.

New York—Strip shipments suggest some stocking materials by consumers. Further acceleration is expected as the quarter advances, shipments against contracts at the old prices having to be made by the end of June. Current prices are 2.33c, New York, for hot strip and 3.13c for cold.

Philadelphia—Strip specifications are expanding, although there is little new business, as most consumers are covered at prices prevailing prior to the advance. The current market is 2.29c, delivered, Philadelphia, for hot strip and 3.09c, for cold.

Wire

Wire Prices, Page 65

Pittsburgh—The last advanced prices on wire products became effective late last week on Pittsburgh or Cleveland base, with nails now quoted $2.60 per keg, plain wire 2.30c, barbed wire 3.00c, annealed fence wire 2.45c, and fencing $63 per base column. Wire specifications appear to have dropped off slightly.

Cleveland—Shipments of wire and wire products in April were the largest of any month this year and were close to the volume of orders driven in last December following announcement of price adjustments for first quarter. Releases indicate still heavier shipments this month. A few miscellaneous sales are noted at the new prices.

Chicago—Wire specifications and shipments show further gains, best demand coming from consumers of manufacturers' material. Jobbers

are slow to increase orders and movement from distributors' stocks, while heavier in some districts, shows only a moderate gain. Heavy tonnages remain on books and maintenance of operations around 60 per cent is expected to be necessary to complete deliveries by the end of this quarter.

Boston—Wire specifications eased slightly with some mills last week, but this situation is considered temporary with most producers who are attempting to convince buyers to order out material evenly over the remainder of the quarter.

Semifinished

Semifinished Prices, Page 65

Semifinished steel producers are building up stocks to meet finishing mill requirements in June. Most semifinished steel users are increasing inventories against higher prices which so far have been nominally quoted. These prices are $30, Pittsburgh, for sheet bars; $29 for billets, and $38 for wire rods. Skelp is quoted 1.70c; tube rounds 1.90c, and forging billets $34, Pittsburgh. Forging billets are more active than at any time in over a year.

Iron Ore

Iron Ore Prices, Page 66

Cleveland—While some producers of Lake Superior iron ore offer to book tonnage for this season at last year's prices, no sales have been reported. The Ford Motor Co. is understood to have arranged with an iron ore interest for 50,000 tons, but the transaction has no bearing on the determination of open-market prices. It is expected that last year's values will apply on long-term contracts, and an announcement is expected shortly.

Ferroalloys

Ferroalloy Prices, Page 66

Ferromanganese specifications are brisk. The market is unchanged at $85, duty paid eastern seaboard. Domestic spiegeleisen, 19 to 21 per cent, is moving fairly well, with spot material holding at $26, furnace.

Quicksilver

New York—Quicksilver prices are unchanged here in a quiet market. Small lots are quoted $76, a virgin flask of 76 pounds, and round lots $75.50 a flask.

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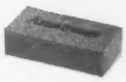

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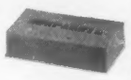

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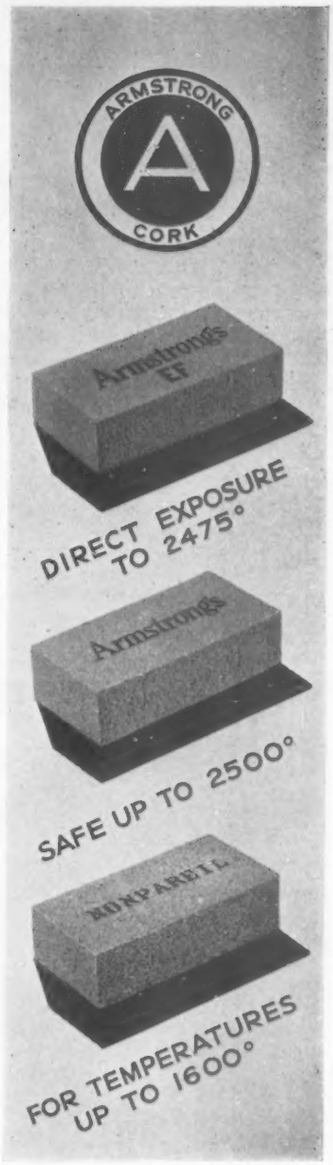

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Armstrong's . . EF . . Nonpareil Brick

Shapes

Structural Shape Prices, Page 64

Pittsburgh—American Bridge Co., Pittsburgh, has been awarded the bulk of requirements for the Boulder dam power plant, about 5876 tons in items one and three. McClintic-Marshall Corp., Bethlehem, Pa., was awarded item four for crane girders, about 95 tons. In addition, last week American Bridge Co. booked over 5500 tons in seven other sizable projects in various localities. Inquiry is slower. Plain structural shapes are 1.85c, Pittsburgh, on new business, but buyers are specifying on contracts at 1.70c.

Cleveland—More small inquiries for industrial work are noted here. Grasselli Chemical Co., Cleveland, has awarded 250 tons for a Chicago plant. The Nickel Plate railroad has tentatively awarded 300 tons for a bridge at Willoughby, O., and Bates & Rogers Construction Co., Cleveland, is about to place 1200 tons for a New York Central railroad bridge at Palmyra, N. Y.

Chicago—Shape fabricators gradually are increasing their operations as a result of heavier orders accumulated over recent months. Shipments of plain material reflect this betterment. Orders total about 5500 tons, a fair portion of which is for private work. Inquiries are headed by 5000 tons for a Minneapolis sewage disposal plant.

The recent $3 a ton increase on steel piling here has been withdrawn.

Boston—Additional public work is developing and the structural outlook in New England is encouraging, represented mainly by requirements for bridges.

New York—Small fabricating shops are taking slightly more business, and fabricated structural steel prices are showing a firmer trend. Inquiry in this district is light. Awards include 1115 tons to the American Bridge Co., Pittsburgh, for a building for the Draper Corp., Hopedale, Mass.

Mill quantity extras on shapes are likely to be announced shortly. It is believed they will apply on orders for delivery at one time and one destination on shapes of one section. German piling is offered about $6 a ton under the new domestic price on sizable jobs in the East.

Philadelphia—Placing of 4575 tons for two plants for the E. I. Du Pont de Nemours Inc., near Richmond, Va., two fabricators participating, is outstanding. New inquiry is featured by 1400 tons of shapes and 1000 tons of piling for the third section of the high-speed line over the Delaware river bridge. Shapes are 2.05½c, Philadelphia.

Shape Contracts Placed

5971 tons, power plant at Boulder dam, Boulder, Nev., 5876 tons to American Bridge Co., Pittsburgh, and 95 tons to McClintic-Marshall Corp., Bethlehem, Pa.

Shape Awards Compared

	Tons
Week ended May 5	41,282
Week ended April 28	11,886
Week ended April 21	14,600
This week in 1933	126,175
Weekly average for 1933	15,413
Weekly average, 1934	17,554
Weekly average, April	12,333
Total to date, 1933	306,734
Total to date, 1934	333,510

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4445 tons, bridge, South Omaha, Nebr., to Omaha Steel Co., Omaha.
3970 tons, state bridge, Coos Bay, Oreg., to Northwest Roads Co., Portland, Oreg., and Virginia Bridge & Iron Co., Roanoke, Va. Awards subject to final approval by PWA engineers.
3610 tons, tunnel supports, Fort Peck Mont., to American Bridge Co.; Silas Mason Co., New York, and Walsh Construction Co., Davenport, Iowa, general contractors.
2700 tons, plant for E. I. Du Pont de Nemours Inc., near Richmond, Va., to McClintic-Marshall Corp., Bethlehem, Pa.
2600 tons, bridge, spillway at Bonnet Carre, La., for Louisiana & Arkansas railroad, to McClintic-Marshall Corp., Bethlehem, Pa.
2000 tons, plant addition, Whiting, Ind., Union Carbide & Carbon Corp., to American Bridge Co., Pittsburgh.
1875 tons, plant, for E. I. Du Pont de Nemours, Waynesboro, Va., to American Bridge Co., Pittsburgh.
1350 tons, state bridge, Joslin, Ill., to American Bridge Co., Pittsburgh.
1310 tons, beam spans at various locations for Missouri Pacific railroad, to American Bridge Co., Pittsburgh.
1110 tons, erecting shop in Hopedale, Mass., for Draper Corp., to American Bridge Co., Pittsburgh.
845 tons, state highway bridge, Spring street, Macon, Ga., to Virginia Bridge & Iron Co., Roanoke, Va.
730 tons, Temple group building, Yale university, New Haven, Conn., to New York Steel Corp., New York; through Marc Eidlitz & Son.
660 tons, state highway bridge, Macon, Ga., to Virginia Bridge & Iron Co., Roanoke, Va.
600 tons, building, American Can Co., Austin, Ind., to American Bridge Co., Pittsburgh.
565 tons, highway bridge, Kennebec river, Fairfield-Benton, Maine, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
500 tons, pier No. 3, Fort Mason, Calif., to Ingalls Iron Works Co., Birmingham, Ala.
480 tons, mill and charging house, Homestake Mining Co., Lead, S. D., to Worden-Allen Co., Milwaukee.
470 tons, stables and print shop, Fort Benning, Ga., to Ingalls Iron Works, Birmingham, Ala.; J. A. Jones Construction Co., general contractor.
450 tons, bridge, Gaviota, Calif., to American Bridge Co., Pittsburgh.
400 tons, bridges, Chicago, Milwaukee, St. Paul & Pacific railroad, to Wisconsin Bridge & Iron Co., Milwaukee.
400 tons, bridge, Benzol, Ark., for Missouri Pacific railroad, to McClintic-Marshall Corp., Bethlehem, Pa.
400 tons, bridge at Bracey, Va., for Seaboard Air Line, to American Bridge Co., Pittsburgh.
300 tons bridge, Vineland, Mo., for Missouri Pacific railroad, to Virginia Bridge & Iron Co., Roanoke, Va.
270 tons, building, New Haven, Conn., for New Haven Pulp & Board Co., Berlin Construction Co. Inc. Berlin, Conn.
260 tons, state bridge, Roselle, Ill., to American Bridge Co., Pittsburgh.
250 tons, produce terminal warehouse, Chicago, to Gage Structural Steel Co., Chicago.
225 tons, bridge, Wichita Falls, Tex., to American Bridge Co., Pittsburgh.
250 tons, plant in Chicago for Grasselli Chemical Co., Cleveland, to Joseph T. Ryerson & Sons Inc., Chicago.
250 tons, estimated, addition, factory group, Brown & Williamson Tobacco Corp., Louisville, Ky., to McClintic-Marshall Corp.; Bethlehem, Pa.; E. H. Pfeiffer, Louisville, general contractor. Reinforcing bars to Jones & Laughlin Steel Corp., Pittsburgh.
230 tons, state highway bridge, Greenwich, Conn., to American Bridge Co., Pittsburgh; Lee Construction Co., Boston, general contractor.
216 tons, state bridge, Boston post road, Bronx, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.
185 tons, additional, armory and sheds, Natick, Mass., to Lehigh Structural Steel Co., Allentown, Pa.; J. Stolnik Co., Boston, general contractor, Reported last week as awarded to unstated fabricator.
150 tons, Class Containers Co., Plant, Vernon, Calif., to Friedman Co., Los Angeles.
145 tons, state bridge, Sullivan and Orange counties, New York, to McClintic-Marshall Corp., Bethlehem, Pa.; through Pallette & Santos, Amsterdam, N. Y.
140 tons, Jewish nursery, Coney Island, N. Y., to Acme Steel & Iron Co., Brooklyn, N. Y.
130 tons, switch racks, water and power department, Los Angeles, to Emsco Derrick & Equipment Co., Los Angeles.

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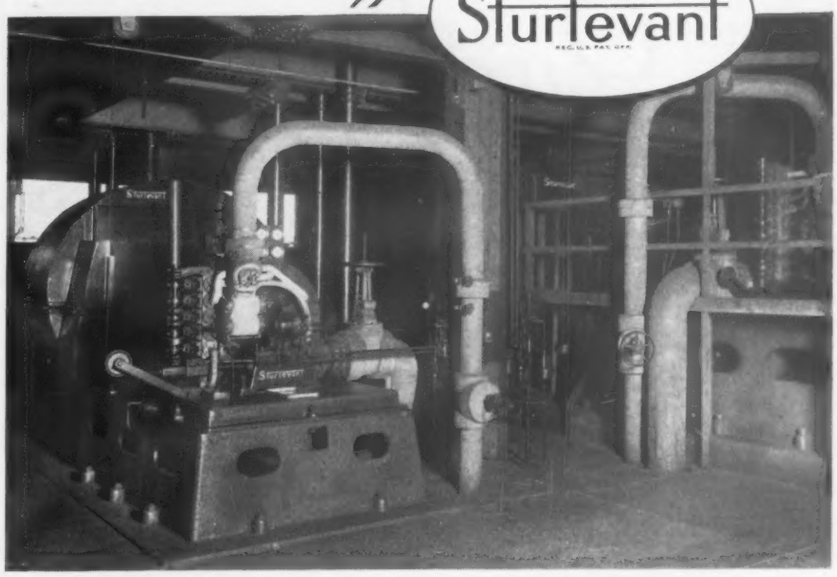

Fairfield Steam Plant, Tennessee Coal, Iron & R.R. Co., Fairfield, Ala., showing Forced and Induced Draft Fans, Reduction Gears and Steam Turbines with automatic speed control, all furnished by Sturtevant.

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The installation shown is an excellent example of the value of this feature of Sturtevant Service. High efficiency and reliability of operation were the controlling factors in equipment selection.

Forced and induced draft fans, gears and turbines were furnished by Sturtevant. The turbines have automatic speed control, permitting the fan speed to automatically follow the load.

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120 tons, state highway bridge RC 3502, St. Lawrence county, New York, to McClintic-Marshall Corp., Bethlehem, Pa.

115 tons, field and officers' quarters, proving ground, Aberdeen, Md.; through Dietrich Bros., Baltimore.

105 tons, shipping building for Carbide & Chemical Corp., South Charleston, W. Va., to Pittsburgh Bridge & Iron Works, Rochester, Pa.

100 tons, Douglas Aircraft Co. plant addition, Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

100 tons, university library extension, Seattle, to Isaacson Iron Works, Seattle; P. P. Gjarde, Seattle, general contractor.

100 tons, school, Webster Groves, Mo., to Columbia Iron Works Inc.; Woermann Construction Co., St. Louis.

100 tons, school, Meriden, Conn., to Berlin Construction Co. Inc., Berlin, Conn.

Shape Contracts Pending

5000 tons, sewage disposal plant, Minneapolis.

2105 tons, Yaquina, Oreg., state bridge; bids May 17.

1400 tons, third section of high-speed line bridge over Delaware river, Camden, N. J.; bids asked. Also 1000 tons of piling and 700 tons of concrete bars required.

1300 tons, bridge for New York Central railroad at Palmyra, N. Y.; Bates & Rogers Construction Co., Cleveland, low for general contract. Project also takes some concrete bars.

1000 tons, lock and dam, Red Wing, Minn., bids to United States engineer, St. Paul.

1000 tons, 700-foot viaduct for New York Central railroad, Weehawken, N. J.

900 tons, fifth regiment armory, Baltimore.

710 tons, highway bridges, Virginia; bids May 17.

640 tons, housing unit and power plant, Bordentown, N. J., for United States government.

600 tons, Illinois state highway bridges; bids May 22.

575 tons, three state bridges, Fairfield, Benton and Canton, Me.; Pittsburgh-Des Moines Steel Co., Pittsburgh, low.

500 tons, buildings, G. A. Hormel & Co., Winona, Minn.

500 tons, sewage disposal plant, Aberdeen, S. Dak.

500 tons, chemistry building, Howard university, Washington; Consolidated Engineering Co., Baltimore, low for general contract.

500 tons, structural work, United Fruit Co., Honduras; bids asked.

400 tons, school, Hammon, Okla.

350 tons, store house extension, Pearl Harbor, T. H., specification 7594; Walker & Olund, Honolulu, T. H., low for general contract.

350 tons, riding hall, Ft. Myer, Va., for Unted States government.

300 tons, municipal improvement, Rochester, Minn.

300 tons, sewage disposal plant and grade schools, Winona, Minn.

300 tons, sewage disposal plant, Grand Fork, N. Dak.

275 tons, Cermak pumping station, Chicago; bids May 9.

250 tons, postoffice, Alhambra, Calif.; Schuler & McDonald, San Francisco., low for general contract.

240 tons, grade separations in Queens, New York, in connection with the Triboro bridge project.

240 tons, bridge for Southern Pacific Co., Sacramento, Calif.; bids soon.

210 tons, state highway bridge, Greene, N. Y.

210 tons, Industrial Arts building, Jamestown, N. Y.

200 tons, sewage disposal plant, Ortonville, Minn.

200 tons, sewage disposal plant, Montevideo.

200 tons, school, Alpers, Okla.

200 tons, state bridge, Middletown, Conn.

160 tons, school for deaf, Scranton, Pa.; Platt Contracting Co., Erie, Pa., awarded general contract.

130 tons, including 80 tons of junior beams, medical school, Little Rock, Ark.; bids asked.

130 tons, high school, Shippenburg, Pa.; John Homan, Philadelphia, general contractor, expected to award steel shortly.

125 tons, two hospital units, Northampton, Mass.

125 tons, state bridge Snohomish county, Washington; bids May 15.

120 tons, I-beam span bridge, Cass county, Iowa, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

110 tons, library, state college, Amherst, Mass.

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COLD DRAWN STEELS

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For that "rush order", convenient and complete stocks of quality flats, squares, hexagons, rounds, shafting and screw stock are carried in every important manufacturing center.

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DETROIT, MICH. — Moltrup Steel Products Co., 810 Stephenson Bldg.
HOUSTON, Texas—W. P. Cunningham, 910 Rice St.
PITTSBURGH, Pa.—McKee-Oliver Inc., 1326 West Carson St.
ATLANTA, Ga. — C. W. Moore, 1545 Westwood Ave., S. W.
NORFOLK, Va. — R. E. Murray & Co., 700 Front St.
SEATTLE, Wash. — M. M. Mossman, 2712—4th Ave., S.
BUFFALO, N. Y. — N. D. Tilbury, 307 White Bldg.
ERIE, Pa. — MacInnes Steel Sales Co., 1326 W. 30th St.

Sales Agencies

CHICAGO, Ill. — Central Steel & Wire Co., 4545 Southwestern Blvd.
DAYTON, O.—Central Steel & Wire Co., East Monument Ave., Extended
DETROIT, Mich. — Central Steel & Wire Co., 5035 Bellevue Avenue

Reinforcing

Reinforcing Bar Prices, Page 65

Pittsburgh—Award of 6000 tons of new billet steel bars for Boulder dam, Boulder, Nev., bids on which went in April 26, has not yet been made, and it is understood that the low bidder is seeking to withdraw its price. Base prices on both rail steel and new steel bars for reinforcement purposes are now quoted with the $3 per ton advance. At Pittsburgh the market on new billet reinforcing bars is 2.05c for cut lengths, and on rail steel bars 1.90c.

Cleveland—The week was one of the quietest in months in concrete bar business here. Public work is lacking, and there has been only a light demand for small lots.

Chicago—An advance of $3 a ton on rail steel reinforcing bars, effective May 7 to 1.95c, Chicago, restores the differential formerly prevailing between this material and billet bars. The latter are 2.10c for cut lengths. Orders are light, but with fairly large awards in prospect for public works.

Boston—Reinforcing bar buying is heavier, largely for highways and bridges. Some of this business was driven in before the recent $3 advance. Inquiry is fair.

New York—Most contractors with definite contracts for specific projects covered their reinforcing bar requirements before the recent advance. On new business, 2.43c, delivered to the job, applies.

Philadelphia—Work on the high-speed line over the Delaware river bridge, Camden, N. J., 700 tons, again features reinforcing bar demand here. Billet steel bars, cut lengths, are 3.34c, delivered, Philadelphia.

Reinforcing Steel Awards

2151 tons, state bridge, Coos Bay, Oreg., to Northwest Roads Co., Portland, Oreg., and Virginia Bridge & Iron Co., Roanoke, Va. Awards subject to final approval of PWA engineers.

2000 tons, for bureau of reclamation, department of interior, Washington, to Truscon Steel Co., Youngstown, O.

250 tons, widening of Western avenue viaduct, Los Angeles, to unnamed interest.

250 tons, school, North Sacramento, Calif., to unnamed interest.

250 tons, addition to sewage disposal plant, Perth Anboy, N. J., divided between Concrete Steel Co., New York, and Capitol Steel Co., Brooklyn, N. Y.

225 tons, water storage tank, Evanston, Ill., to Inland Steel Co., Chicago.

200 tons, infantry school Fort Benning, Ga., to Kalman Steel Corp., Bethlehem Pa.; Perry Fireproofing Co., Chicago, general contractors.

190 tons, dormitories, Dillard university, New Orleans, to Ole K. Olsen Co., New Orleans, from Woodward Wight Co., New Orleans; G. J. Glover Co., New Orleans, general contractor.

Concrete Awards Compared

	Tons
Week ended May 5	7,149
Week ended April 28	5,589
Week ended April 21	5,820
This week in 1933	7,578
Weekly average for 1933	3,771
Weekly average, 1934	4,934
Weekly average April	5,214
Total to date, 1933	64,961
Total to date, 1934	93,750

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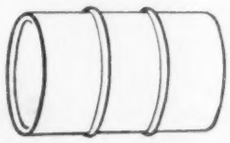

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There are very few limits to resistance welding. Thomson-Gibb has developed machines to join parts much smaller than a needle. Objects many times the size of an average barrel are welded on a production scale.

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Product..... Metal.....

Approximate dimensions.....

Desired production per hour.....

6049

Jones & Laughlin Steel Corp., Pittsburgh, awarded small tonage of structural material.

186 tons, immigration station, Ellis Island, N. Y., to Igoe Bros., Newark, N. J.

178 tons, 5-story building, McLeod Infirmary, Florence, S. C., to Kalman Steel Corp., Bethlehem, Pa.; Fiske-Carter Construction Co., Greenville S. C., general contractor.

176 tons, laboratory and other buildings, department of agriculture, Beltsville, Md., to American Steel Engineering Co., Philadelphia; North-Eastern Construction Co., Baltimore, general contractor.

170 tons, King county, Washington, state bridge, to Pacific Coast Steel Corp., Seattle; Nelse Mortensen & Co., Seattle, general contractor.

156 tons, state undercrossing in Tucson, Ariz., to unnamed interest.

150 tons, state crossing, La Tijera boulevard, Los Angeles county, California, to unnamed interest.

117 tons, highway work in Mohave county, California, for United States bureau public roads, to Soule Steel Co., San Francisco.

100 tons, road work, Northampton borough, Pennsylvania, to Taylor-Davis Inc., Philadelphia.

100 tons, or more, Marshall high school, Rochester, N. Y., to Whitacre Engineering Co., Chicago; A. Friederich & Sons Co., Rochester, general contractor.

100 tons, or more, university library extension, Seattle, to Pacific Coast Steel Corp., Seattle; P. P. Gjarde, Seattle, general contractor.

100 tons, postoffice, Holyoke, Mass., to Sweet Steel Co., Williamsport, Pa.; Tremeglio Bros., Waterbury, Conn., general contractors.

100 tons, bridge, Greenwich, Conn., to Truscon Bridge Co., Youngstown, O.; through Lee Construction Co., Boston.

Reinforcing Steel Pending

2210 tons, Broadway tunnel, Oakland, Calif.; bids soon.

1306 tons retaining wall, Long Beach, Calif; bids soon.

1125 tons, Yaquina, Oreg., state bridge; bids May 17.

700 tons, section of high-speed line over Delaware river bridge, Camden, N. J.; bids asked.

700 tons, section 6, Chicago sanitary district sewage project; general contract awarded to S. A. Healy, Detroit. Steel to be rolled by Illinois Steel Co., Chicago.

260 tons, spillway extension, El Capitan dam, San Pedro, Calif., general contract to Bodehammer Construction Co., Oakland, Calif.

237 tons, grade separations in Queens, New York, in connection with the Triboro bridge project.

229 tons, state viaduct, route R-498, Monroe county, Pennsylvania; bids May 4.

228 tons, state highway work in Los Angeles county, California; bids May 17.

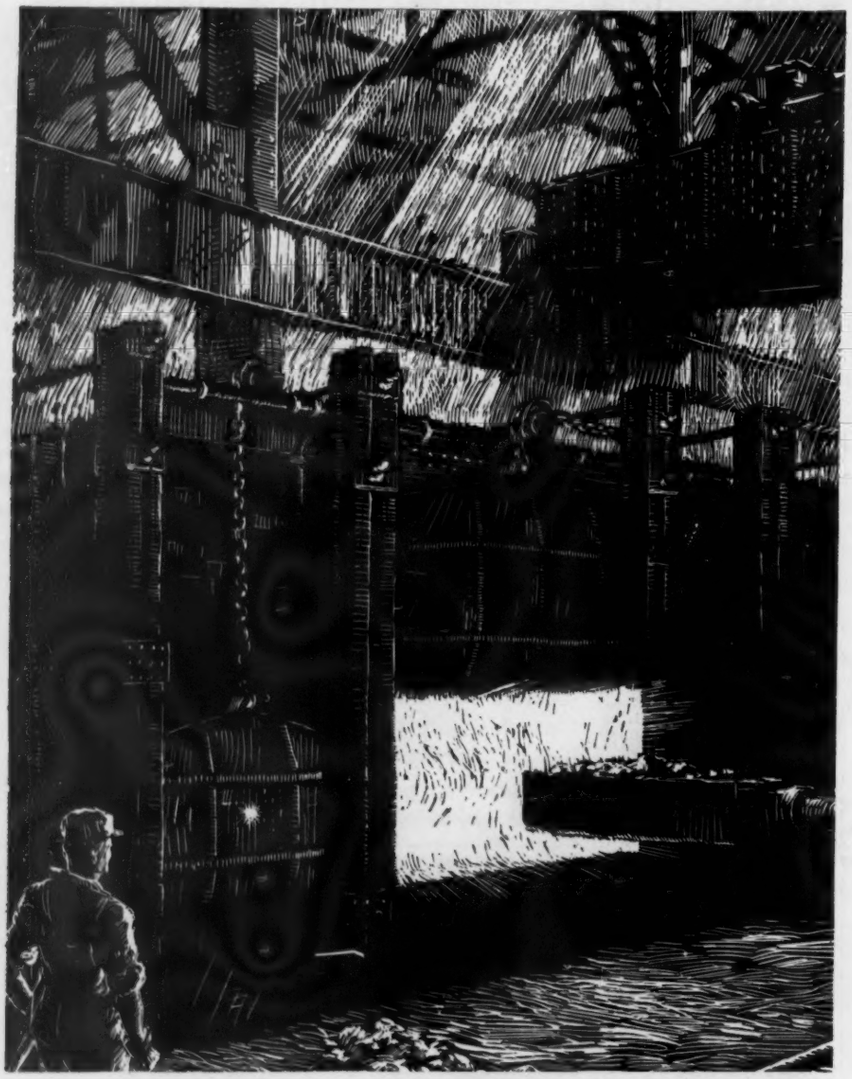
228 tons, foundation wall, Ellis Island, N. Y.; Shaw Construction Co., Astoria, Long Island, N. Y., low.

210 tons, state highway work in Los Angeles county, California; bids May 17.

165 tons, highway structures, Virginia; bids May 17.

135 tons, bridge, route 29, over Raritan river, New Jersey; bids opened.

130 tons, Washington state highway project; general contract to Fiorito Bros., Seattle.



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Pipe

Pipe Prices, Page 65

Pittsburgh — With revised discounts of usually 3½ points less now quoted on standard and line pipe, no important business was driven in before the lower prices expired. It had been expected that a few smaller line pipe projects pending for many months might be closed but financing, as in the case of the 240-mile natural gas line for Detroit, Flint, Mich., and Pontiac, Mich., precluded pipe buying. Green-Wolf, New York, was low at $1728 for 60 valves for Pittsburgh army engineers last week, for Montgomery locks. Although lap weld pipe is in poor demand, a Wheeling district producer has been producing some stock.

Chicago — Cast pipe prices are

unchanged despite recent advances in pig iron and labor costs. While upward revisions in pipe quotations still are anticipated, no intimations are given of early changes. Demand continues slow and unimproved. Producers are awaiting releases on orders, some of which are six months old. Pending work in this and nearby states remains heavy and it is unlikely that producers would be able to complete delivery this year in event of early closing on such orders.

Two large orders for spiral weld pipe for gas lines have been booked by Naylor Pipe Co., Chicago. Five miles of 16-inch pipe will be required for a gas vacuum line for Phillips Petroleum Co., Burbank, Okla., and several miles of 16-inch pipe will be used for a pressure gas line of American Natural Gasoline Co., Shamrock, Tex. involving a total of upward of 1000 tons of steel.

Boston—Cast pipe buying is heavier, although mainly in lots under 500 tons. Woonsocket, R. I., has bids on a year's requirements. Prices continue to show a rather wide range. Inquiry is fair.

New York—Cast pipe buying is slow, but inquiry is increasing, the largest being 1035 tons for Oswego, N. Y.

Philadelphia — Effect of recent increases in steel pipe has been partially nullified by action of mills in permitting jobbers to sell pipe out of stock for shipment over the remainder of the quarter at levels prevailing before the recent advance went into operation.

Birmingham, Ala.—Recent orders have been for a little better tonnage and production is steady. Production is above 60 per cent of capacity.

Cast Pipe Placed

400 tons, Brockton, Mass., to R. D. Wood & Co., Philadelphia.

350 tons, Great Barrington, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

174 tons, water system, Fort Sill, Okla., to Sherman Machine & Iron Works, Oklahoma City, Okla.

170 tons, Malden, Mass., 6 to 16-inch, to Warren Foundry & Pipe Corp., New York.

170 tons, Methuen, Mass., to Warren Foundry & Pipe Corp., New York.

140 tons, universal pipe, Monterey, Calif., to Central Foundry Co., Birmingham, Ala.

120 tons, 8 and 12-inch, class 150, Beverly Hills, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

105 tons, Westerly, R. I., to Warren Foundry & Pipe Corp., New York.

100 tons, 6, 8 and 10-inch, monocast, Olympia, Wash., to American Cast Iron Pipe Co., Birmingham, Ala.

100 tons, Concord, N. H., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

1035 tons, 8 to 12-inch, Oswego, N. Y., bids May 8; also 22,000 feet 2-inch galvanized steel pipe.

850 tons, 20 inch Seattle seawall improvement; bids in; alternates on steel pipe.

375 tons, 8-inch and under, Humble, Tex.; bids May 8, also elevated steel tank.

200 tons, 2 to 8-inch class 150, Fort Peck, Mont., dam; bids May 10.

161 tons, 16-inch, class 150, Arcadia, Calif., bids in.

130 tons, 10-inch, Goshen, N. Y.; bids in.

Steel Pipe Pending

550 tons, small metal tubing, Grand Coulee dam and power house, Columbia basin project; construction bids June 18, bureau of reclamation, Spokane; government to purchase materials; requirements also include 125,000 lineal feet metal sealing strips and 120,000 lineal feet electrical conduit.

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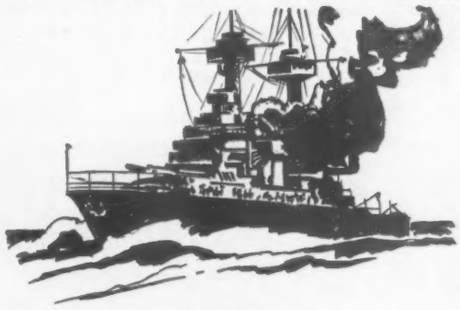

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Pig Iron

Pig Iron Prices, Page 66

Pittsburgh—With important pig iron users all under cover of contracts there has been no actual test of the advanced market of $18.50, Neville Island, for foundry grades, $18 on basic and $19 on bessemer. Shipments, however, are heavy, including those on the year's requirements of a wrought iron producer here who recently has taken in some 18,000 tons of bessemer on an order placed last fall with a steelworks interest. Shipments are also going ahead on an order for a nonintegrated user, this being for about 5000 tons of basic iron placed with a merchant furnace recently.

Cleveland—Shipments by a leading merchant furnace interest in April were approximately 20 per cent heavier than in March with automotive requirements leading, and a well sustained diversified demand. The Otis Steel Co. here has lighted another blast furnace, now operating both its stacks.

National Tube Co., Lorain, has blown in its third blast furnace.

Chicago—Pig iron consumption is steady in most industries, while shipments show some additional improvement. April deliveries were about 15 per cent heavier than those of March and tonnage remaining on books indicates a sharp gain in the movement the rest of this quarter. Recent coverage prior to the advance in prices was sufficiently broad to necessitate but little spot buying. No. 2 foundry and malleable continue $18.50, furnace.

Boston—Pig iron activity is limited to small shipments, with new inquiry light. Consumers covered fairly heavily, except some small users who will continue to buy spot iron. Considerable interest continues as to the operations of the Troy, N. Y., furnace which, in building up a backlog, is reported to have included at least two New England steelworks for quotas.

New York—Releases are lighter, with only scattered orders at the new prices. The Troy furnace has not resumed, although scheduled for May 1.

Philadelphia—Pig iron tonnage is light, with specifications coming out at a rate disappointing to most producers, who look for difficulty in meeting shipments in June. Swedeland, Pa., furnace resumed May 1.

Buffalo—Buying is at a standstill, but shipments are good, near the best point of the year. Six furnaces continue in production. Recent covering has removed all pending inquiry of large size.

Cincinnati—Shipments are well maintained and promise to be heavier this month than in April. The melt is satisfactory in some lines, chiefly stoves and automobiles.

St. Louis—Having covered thoroughly, users of pig iron are out of the market. Shipments to consuming plants, however, continue on a large scale. April exceeded March, and indications are that the May movement will be the largest in several years. The melt is holding up extraordinarily well. Stove manufacturers are particularly active. They are making up stock in anticipation of demands later in the year, besides turning out a large quantity of goods for which actual orders have been booked. All sections of the farm implement industry are busy.

Birmingham, Ala.—New orders are less frequent but shipments remain steady. Ten blast furnaces are on.

Toronto, Ont.—Demand is sustained with the daily melt holding at 40 per cent. Prices are firm and unchanged.

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Scrap

Scrap Prices, Page 67

Pittsburgh—The market generally eased another 25 cents last week. Heavy mid-western supplies of scrap are seeking to be forced onto the Pittsburgh market and shipments by barge from as far south as Louisiana have been moving into the Pittsburgh district on old orders.

A mill in this district has bought several thousand tons of hydraulic compressed bundles at $13 delivered. Heavy melting steel on the list of the Western Maryland sold here today at $13. Machine shop turnings are down, quoted now at $8.50 to $9.

Cleveland—Steel makers continue to take shipments of open-hearth and blast furnace scrap on contracts. Supplies from outside are being received in about the same volume as before the recent reduction. Prices are unchanged but weak and nominal.

Chicago—Iron and steel scrap prices have declined 25 to 50 cents a ton under the influence of heavy shipments and lighter demand. Sell-

ers have covered the larger portion of orders placed a short time ago and are less active in buying. No. 1 heavy melting steel to a certain extent is nominal at $11.25 to $11.75, off 25 cents.

Boston—Several scrap grades are lower and buying is light. The largest steel works is taking in little scrap and demand for outside shipment has also declined, although some barge buying is being done for eastern Pennsylvania.

Heavy melting grades are lower, the Worcester, Mass., melter paying $9 delivered as the maximum for No. 1 heavy melting steel.

New York—Heavy melting scrap grades for barge shipment are 50 cents lower with weakness also apparent in several cast grades. Domestic demand is light, consumers taking limited shipments and doing little buying. Export demand, however, holds up well with some substantial purchases for Italy and Japan.

Philadelphia — Following recent substantial buying, in which the leading Claymont, Del., consumer took 5000 tons and the principal Coatesville, Pa., melter a substantial tonnage, at $11.50, delivered, heavy melting steel has softened to $11 to $11.50. Export buying in the East is featured by a sale of 10,000 tons of No. 2 steel, with the market on steel scrap off about 50 cents.

Buffalo—Scrap has weakened as a result of arrival of much water-borne tonnage. Principal melters are restricting shipments. Steelworks now offer $12 for No. 1 heavy melting steel, a reduction of $1 a ton from the best prices paid recently. Dealers claim only minor tonnage is being sold at the new prices and that there is much more tonnage to be delivered at best prices of the year.

Detroit — No. 1 heavy melting steel, hydraulic compressed sheet scrap, machine shop turnings and blast furnace material declined 50 cents a ton last week. Supplies exceed needs.

Cincinnati — Prices of iron and steel scrap are 50 cents lower on most grades, with offerings heavier. Leading consumers are not buying but continue to accept contract shipments.

St. Louis—Buying of iron and steel scrap continues in small volume, and entirely on a necessity basis. One east side mill purchases a fair-sized tonnage, but otherwise no transactions exceeding 100 tons were reported by local melters.

Birmingham, Ala.—Market continues sluggish with shipments rath-

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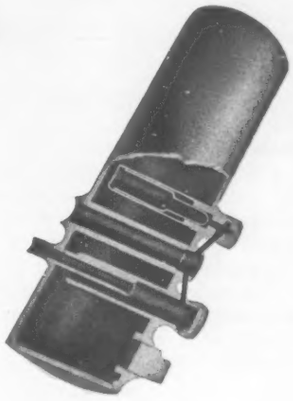

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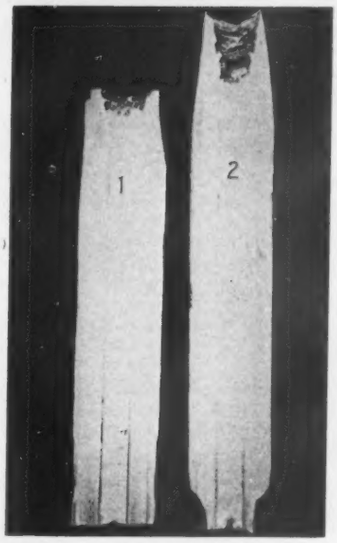

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er irregular. Quotations are unchanged.

Toronto, Ont.—Trading in iron and steel scrap is specialized and spotty. While there is a consistent demand for iron grades, steel lines are moving slowly. Dealers state that regular sales are being made in cast and new business is developing in wrought scrap, while stove plate and malleable are spotty and other lines dull.

Warehouse

Warehouse Prices, Page 68

Pittsburgh—Effective May 1, large rivets are quoted $3.50, black soft annealed wire 2.70c, soft galvanized wire 3.05c, nails $2.82 for siding delivery and $2.834 per keg for truck delivery, all in town Pittsburgh, 10 cents less for delivery outside. Extras for small mill shipments may be changed to place warehouses and mills on an equal footing.

Cleveland—Warehouse prices still are in process of adjustment to recent mill advances. In addition to those announced here a week ago, cold rolled strip now is quoted 3.20c, base, for local delivery. While this apparently is a reduction from the former base of 5.55c it does not include straightening and cutting as did that price. Also, new quantity differentials bring the price more in line with mill prices, for small quantities. The market last week was a little quieter.

Chicago—Sales have continued active and April orders were the heaviest for the year. Black and galvanized sheets have been advanced $8 a ton and billet reinforcing bars $3.

Boston—With higher warehouse prices now effective, total tonnage has lessened, although the number of small orders continues, with demand well spread.

New York—Advances in warehouse prices have not yet included cold-finished. Galvanized sheets are up $8 a ton. Volume continues to hold well with many small orders.

Philadelphia—An advance of $5 a ton on a number of items out of warehouse here became effective May 7. While some jobbers reported an increase in April volume, nevertheless, it was generally disappointing.

Baltimore—Advances in hot-rolled products out of warehouse are expected shortly. There is some improvement in buying in expectation of this advance.

Detroit—Additional steel price advances out of local warehouse are in effect. Shipments are steady despite price advances. Sales in April were generally as good as in March.

Cincinnati—Demand so far in May has equaled April in spite of price advances.

St. Louis—Purchasing of iron and steel materials from warehouse continues in good volume, though aggregate of new orders during the last half of April fell below the first two weeks.

Metallurgical Coke

Coke Prices, Page 65

Prices on Connellsville oven beehive coke are steady and unchanged but lack of demand continues. One large buyer of coke, a merchant furnace in the Pittsburgh district, recently turned over from a mixture of beehive and by-product coke to a straight by-product supply.

By-product foundry coke prices at Chicago have been extended through May at $8.50, ovens, for outside delivery and $9.25, delivered Chicago. April shipments show a small gain over those of March and have continued steady so far this month.

Buying is small at St. Louis as consumers are well covered but shipments maintain a high level. Specifications for by-product foundry coke at Cincinnati are increasing. Domestic sales are heavy following the spring reduction in price. Ovens at Birmingham, Ala., continue active production with considerable shipments to western users.

Cold Finished

Cold Finished Prices, Page 65

Pittsburgh—The cold-drawn bar market remains firmly quoted at 2.10c base, Pittsburgh. However, in cold-drawn alloy bars the market is now 3.05c, Pittsburgh, which reflects a $2 a ton advance, effective late last week. Carbon and alloy cold-drawn bars reflect an easier situation. Some consumers in the Detroit district have entered specifications for May delivery which reflect a considerable decrease from those of April.

Western Automatic Machine Screw Co., cold-drawn bar steel division, Elyria, O., has been awarded 95,700 feet of free-machining cold-drawn screw stock for Frankford arsenal, Philadelphia, at 3.215c, delivered.

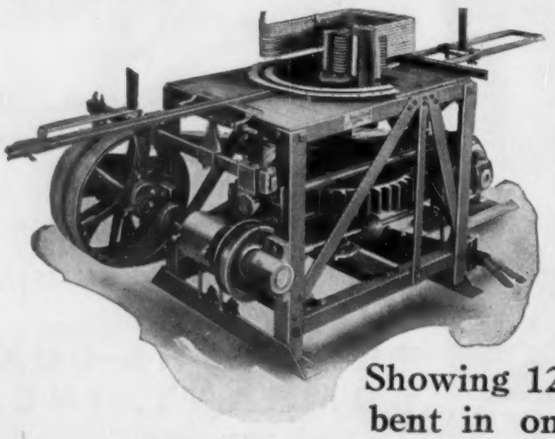
Coke By-Products

Coke By-Product Prices, Page 65

New York—Production and demand for coke oven by-products have improved. Toluol buying by the lacquer trade is especially strong. Contract shipments to the larger buyers of naphthalene are satisfactory.

Sommerfeld Machine & Mfg. Co., Braddock, Pa., has changed its name to Sommerfeld Co.

The Kardong Stirrup Bender



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New Prices Filed With Institute

LOWEST base prices for the products mentioned, and effective dates, filed with the American Iron and Steel institute, New York, last week include:

May 4

Cold-rolled alloy chain steel, S. A. E. 2300, 7.10c,; S. A. E. 3100, 6.15c; S. A. E. 4100, 6.75c, Pittsburgh.

May 5

Flat galvanized, culvert, copperbearing steel sheets, 3.21c for No. 16 gage, Pittsburgh.

Flat galvanized toncan molybdenum copper culvert sheets, 3.54c for No. 16 gage, Pittsburgh, and 4.24c for No. 16 gage, Pacific coast ports.

Flat galvanized central pure iron culvert sheets, 3.54c for No. 16 gage, Pittsburgh, and 4.24c for No. 16 gage, Pacific coast ports.

Flat galvanized nocorro copper iron culvert sheets, 3.49c for No. 16 gage, Pittsburgh, and 4.19c for No. 16 gage, Pacific coast ports.

Prices to be effective May 5 on galvanized corrugated roofing and siding 26 inches wide, at Pittsburgh, and on galvanized corrugated roofing and siding, 2 inches, 2½ inches and 3 inches, at Gary, Ind., have been withdrawn.

May 6

Cold-rolled alloy chain steel, SAE 2300, 7.30c; SAE 3100, 6.35c; and SAE 4100, 6.95c, Worcester, Mass.

New billet steel concrete bars, 2.00c, Birmingham, Ala.

May 7

Cold-rolled strip steel, 3.00c, Worcester, Mass., and 2.80c, Pittsburgh.

Alloy blooms, billets and slabs, $51, Buffalo.

Hot-rolled alloy steel bars, 2.55c, Buffalo.

Malleable pig iron, $14.50, Birmingham, Ala.

Foundry pig iron, $14.50, Birmingham, Ala.

Galvanized ingot iron 2½ inch corrugated, 26 inches wide, at Gary, Ind., and Pacific coast ports.

Bessemer or basic manufacturers wire, 2.75c, Pacific coast ports and 2.78c, Houston and Galveston, Tex.

Annealed fence wire, 2.50c, Chicago; 2.85c, New Orleans; 2.75c, Houston and Galveston, Tex.; 3.00c; Pacific coast ports.

Galvanized fence wire, 2.85c, Chicago; 3.20c, New Orleans; 3.10c, Houston and Galveston, Tex.; 3.35c, Pacific coast ports.

Annealed stone wire, 4.30c, Pittsburgh, and 4.95c, Pacific coast ports.

Galvanized stone wire, 5.30c, Pittsburgh, and 5.95c, Pacific coast ports.

Weaving wire, not for fly screen cloth, 3.90c, Pittsburgh.

Tag wire, 3.90c, Pittsburgh.

May 8

Uncropped alloy ingots, $42, Buffalo.

Hot-rolled strip (rail steel), 1.85c, Chicago.

Unassorted long ternes, 4.35c, Pacific coast ports.

Single loop bale ties, $63, Pittsburgh.

Rail steel merchant bars, 1.85c, Chicago.

Common iron bars, 1.75c, Terre Haute, Ind.

May 10

Flat galvanized copper iron, and copperbearing pure iron culvert sheets, 3.64c, Birmingham, Ala.

Common iron bars, 2.10c, Louisville, Ky.

Special analysis die block steel, $51, Chicago.

Poultry fence, base, Spec. No. 17, $122, Anderson, Ind.

Various wire specialties based at Cleveland, Chicago, Pittsburgh and Worcester.

May 11

Special analysis die block steel, $51, Canton, O.

Electric furnace plain carbon steel, hot-rolled, general requirement grade, but not including tool steel grade. Carbon up to 0.50 inclusive; bars, 3.05c; billets, $61.; Carbon 0.51 to 0.80 inclusive; bars, 3.30c; billets, $66. Carbon 0.81 to 1.05 inclusive; bars, 2.55c, billets, $71, all at Canton, O.

Electric furnace SAE, 1095 spring steel rounds, bars, 3.05c, Canton, O.

Low carbon spring wire, 2.30c, Cleveland.

Poultry fence, spec. No. 17, $121, Cleveland.

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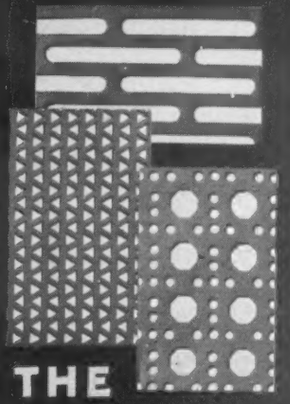

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Nonferrous Metals

Nonferrous Metal Prices, Page 66, 67

New York—Demand for lead was outstanding in the nonferrous metal market last week. Prices were fairly steady with the exception of tin and zinc which eased somewhat.

Copper—Confusion continued regarding provisions of the code which went into effect late last month. Producers agreed to curb sales of non-Blue Eagle copper until May 22 when it is expected that the code will become more clarified. Non-Blue Eagle copper, which may not be used in materials for the government, still was available from some second-hands but in small quantity. Special committees now are working on code clarification. Blue Eagle copper continued quiet and unchanged at 8.50c, Connecticut.

Lead—This metal was in relatively the heaviest demand with consumers coming into the market for June requirements. Prices held steady at 4.10c, East St. Louis, and 4.25c, New York. The lead code is ready for signing.

Zinc—Easiness developed late in the week when prime western metal sold at 4.35c, East St. Louis, compared with 4.40c recently. Buying generally was in light volume. The industry is agreed on its code with exception of labor provisions which are expected to be worked out satisfactorily shortly.

Tin—Straits tin declined approximately 2 cents per pound in a period of two weeks with metal for spot delivery selling at around 54.00c at the close of last week. The tin cartel has decided to increase export quotas 10 per cent.

Antimony—Prices rose sharply on a stronger market in China and improved demand.

Aluminum — Prices retained a steady tone, with light demand.

Nickel—Canadian production in the first two months of 1934 jumped to 16,536,829 pounds from 3,771,001 in the corresponding period last year. Prices were steady.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 65

Orders for bolts and nuts declined last week at Pittsburgh, from the higher volume of late April. Chicago noted unchanged demand from major users, while jobbers have been taking heavier shipments.

Prices are unchanged from 70 off for carriage and machine bolts; large rivets 3.00c, Cleveland and Pittsburgh, and 3.10c, Chicago; small rivets 70 and 5 off. Wrought washers are 6.25 off but an advance to 5.75 off is believed near.

Tin Plate

Tin Plate Prices, Page 64

Pittsburgh—Tin plate specifications sustain on 80 per cent operating rate in Pittsburgh district mills.

New York — Because of especially heavy releases by canmakers earlier in the year in the expectation of possible labor difficulties tin plate releases have declined sharply.

Equipment

Pittsburgh—Award of a new hot strip mill is expected this week by a Detroit buyer. This mill is expected to roll 16 inches and under and will be installed in a plant in metropolitan Detroit. The buyer last week negotiated for several second-hand mill motors. Steel mill equipment market from other sources is active, with several large mill installations being promised for early closing.

Boston—New England machine building shops are figuring a fair volume of machinery inquiry, with a few orders being placed. Several shops in the Worcester district are active, including textile mill equipment builders. In general, however, the situation is unchanged. Brown & Sharpe Mfg. Co. has taken several units for the navy, also Jones & Lamson Machine Co.

Washington—Bids close May 16 with the chief, bureau of yards and docks, navy department, Washington, for removing a 150-ton bridge crane and a 35-ton bridge crane from the existing runways; decreasing the span of the 150-ton crane approximately 24 feet and increasing the lift approximately 23 feet; increasing the span of the 35-ton crane approximately 6 feet and the lift 21 feet; transporting the cranes from their present to the new location; specification 7590.

Chicago—Plant equipment demand continues to improve although only slight changes are noted in inquiries and orders for heavy machinery. Sharp gains have been recorded in sales of miscellaneous small tools, such as drills, hacksaws, tool hold-

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BENDING ROLLS—25' 6" NILES-BEMENT-POND Plate. Pyr. Type. Arr. for MD. Top roll 24-7/8" dia. Bottom rolls 18" dia. Cap. 1" plate. Drop end housing.
10' 2" MARSHALLTOWN Plate. Pyr. Type. MD with Slip Ring AC Motor and Starter. Top roll 8-1/4" dia. Bottom rolls 7" dia. Drop end housing. Cap. 1/4" plate.

CENTRIFUGAL COMPRESSORS—(2) G. E. dir. conn., 8000 and 5400 cu. ft., 1.5 lb. pressure, AC motors and starters.

CRANE—5-T. SHEPARD Overhead Elec. Trav., 52' 4" span, 230 v. DC. Also equipped for bucket & magnet operation. 350 feet of Double "A" Frame Runway.

HEADER—No. 2 O.D.T.S. WATERBURY FARREL Open Die, Triple Stroke. Cap. 1/4" to 3/8" dia. wire. BD. Like new.

MAGNET—45" ELECTRIC CONTROLLER MFG. CO., 230 V. DC.

MOTORS—(3) 200 HP WESTINGHOUSE, Type CW, 3 ph. 60 cy. 440 v. Slip Ring, 900 RPM, complete with pulleys, drum controllers and resistance.

PRESS—No. 6-1/2 BLISS Str. Side, Dbl. Crank with spring counterbalance. BD. 54" bet. housings. 8" stroke.
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ers and the like, business in some of these items during the past six to eight weeks having exceeded the total volume of the preceding several years. Only small inquiries are appearing for machine tools and orders also are light. Union Pacific railroad has placed a radial drill for its Omaha shops, with demand from railroads generally light. Steel company purchases are of a miscellaneous nature.

New York—Orders for machinery and equipment are heavier, largely for one or two tools of a specialty type. Except for a list of machinery for the Frankford, Pa., arsenal and a continued steady demand from the navy department, inquiry is generally for small lists. An eastern steel mill is about to close on one of the largest brakes yet made. Ajax Electrothermic Corp., Trenton, N. J., is the only bidder on a melting furnace unit for the navy department, Washington, at $43,500.

Pacific Coast

Pacific Coast Prices, Pages 65, 66, 68

San Francisco—(*By Air Mail*)—Continued improvement is noted in demand for steel products and a number of new projects have come out.

Concrete bar awards during the week aggregated over 4100 tons. To date this year 45,036 tons have been booked, compared with only 16,932 tons for the corresponding period a year ago. Soule Steel Co. booked 117 tons for highway work in Mohave county, California. Pending business now exceeds 24,000 tons.

United States bureau of public roads placed 218 tons of 24 to 48-inch pipe with unnamed interests for highway work in Mohave county, California. Bids have been opened on 2500 tons of liner plates and 290 tons of 22-inch pipe for the metropolitan water district, Los Angeles.

Structural shape lettings totaled 5698 tons, the largest weekly total of the year and brought the aggregate to date to 36,334 tons, compared with 131,412 tons for the same period in 1933. Ingalls Iron Works Co., Birmingham, Ala., took 500 tons for pier No. 3, Fort Mason, Calif. Pending business exceeds 22,861 tons.

American Cast Iron Pipe Co., Birmingham, Ala., booked 120 tons of 8 and 12-inch pipe for Beverly Hills, Calif., and the Central Foundry Co., Birmingham, secured 140 tons for Monterey, Calif. Bids open on May 10 for 200 tons for the Fort Peck, Mont., dam project. Arcadia, Calif., is in the market for 161 tons.

The contract for 1426 tons of aluminum conductor cable for the Fort Peck dam project has been let to Fritz Ziebarth and H. H. Walker Inc., Los Angeles, at 21 cents per foot. San Francisco will open bids May 11 for special track work under bid No. 1188.

Coos Bay Bridge Let

Seattle.—Subject to approval of PWA engineers, the Oregon highway commission has awarded to the Northwest Roads Co., Portland, Oreg., and Virginia Bridge & Iron Co., Roanoke, Va., the contract for erection of the Coos Bay bridge, on a combined low figure of $2,123,318. This is the second and largest project of the five proposed bridges in this system. The third, the Yaquina span, involving 1125 tons of reinforcing and 2105 tons of shapes, will be up for figures May 17.

The Coos Bay bridge calls for 3970 tons of structurals and 2151 tons of reinforcing. The Portland firm bid $1,529,438 for the piers and approaches and the Roanoke company $593,880 for the steel arch spans. Other bidders for the steel were: McClintic-Marshall Corp., San Francisco, $603,858; Columbia Steel Co., San Francisco, $615,713; Moore Dry Dock Co., San Francisco, $625,982.

While the week's awards were not impressive, considerable business is pending. Pacific Coast Steel Corp., Seattle, booked 170 tons for the Marine View bridge, King county, Washington, and 100 tons or more for the university library addition, Seattle. Fiorito Bros., Seattle, have a state paving contract requiring 130 tons of concrete bars.

Isaacson Iron Works, Seattle, took 100 tons of shapes for the Seattle library structure, reduced from original estimate of 200 tons. Bids have been opened for the Douglas bridge, Juneau, Alaska, 805 tons. Bids May 15 will include a state bridge in Snohomish county, calling for 125 tons of shapes. Olympia, Wash., has awarded to the American Cast Iron Pipe Co., Birmingham, Ala., 100 tons of monocast pipe. Seattle has opened tenders for water pipe for the seawall improvement, alternates for 850 tons of 20-inch cast iron pipe or about 450 tons of steel mains.

Jobbers have had an active month, although volume has decreased since the revised price lists went into effect.

Scrap continues active with exporters seeking suitable tonnages. Local stocks are depleted and Oriental demand still is strong. There are indications of further price advances.

Steel in Europe

Foreign Steel Prices, Page 68

London—(*By Cable*)—Conditions in the steel and iron market are excellent and producers are generally busy.

An additional hematite blast furnace stack has been blown in in the Middlesbrough district. A Middlesbrough steelmaker is now producing special steels. Export inquiries for tin plate are expanding but prices are low because of intense foreign competition by other heavy producing countries.

The Continent reports export trade slightly improved, especially in structural steel. The International Rail Manufacturers' association reports its volume of business is expanding.

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Construction and Enterprise

New England

BOSTON—Raytheon Mfg. Co., 55 Chapel street, manufacturer of radio tubes and equipment, has acquired the former plant of Charles M. Howell & Son, Waltham, Mass. The company's plant at Newton, Mass., will be removed to the new property and facilities will be increased.

HOLDEN, MASS.—Oslund Bros. Machine Co. Inc., South Main street, has been incorporated by Charles H. and Walter W. Oslund to manufacture machinery.

EVERETT, MASS.—Merrimac Chemical Co. Inc., Chemical lane, will build a 1-story addition 62 x 140 feet, to cost about $30,000, including equipment.

New York

OLEAN, N. Y.—Metal Cabinet Works will resume operations in the near future, after being closed for the past three years.

BROOKLYN, N. Y.—Central Casting Inc. has been formed by Leo and Joseph Zellinger, 102 South Third street, Allentown, Pa., to manufacture nonferrous castings.

NEW YORK—Marino Spring Co. Inc. has been formed by John Orman, 341 Fifty-sixth street, Brooklyn, N. Y., and associates, to manufacture coil springs.

NEW YORK—Manhattan Water Meter Repair Co., 330 East Twenty-fourth street, is establishing a new plant at 430 East Twenty-third street for manufacture of parts for water meters.

NEW YORK—Fabricated Metallic Products Corp. has been organized by Albert Bornstein, 345 Cypress avenue, Bronx, to manufacture a line of metal products.

New Jersey

BURLINGTON, N. J.—Burlington Industrial Alcohol Co., Pearl street, is planning to build a 1-story, 60 x 96-foot steel structure. Harry H. Williams, 218 East Union street, Burlington, N. J., will build if project matures.

CAMDEN, N. J.—State board of commerce and navigation has granted a permit to a corporation, care of South Philadelphia & New Jersey Tunnel association, care of Verus T. Ritter, 304-06 Market street, Camden, N. J., for a $25,000,000 vehicular tunnel from South Philadelphia, Pa., to a point near Westville, Gloucester county, N. J., under Delaware river.

PERTH AMBOY, N. J.—Abarry Iron & Steel Co. has been incorporated with $125,000 capital to deal in iron and steel. Abraham Goldberg is agent.

Pennsylvania

ALLENTOWN, PA.—Clarence E. Wunder, Architects' building, Philadelphia, architect, has received bids for construction of 3-story bottling plant, 55 x 200 feet, for the Neuweiler Brewing Co., 401 North Front street, Allentown, Pa.

EAST PITTSBURGH, PA.—Westinghouse Electric & Mfg. Co. has started construction of a new boiler house for plant process and heating purposes at its East Pittsburgh works. Four new boilers will be installed and each will be provided with full automatic coal handling equipment.

ELVERSON, PA.—Edwards & Hoffman, Otis building, Philadelphia, architects, are preparing plans for alterations and addition to still room for the Old Orchard Distillery Inc., Elverson, Pa.

HARRISBURG, PA.—Bureau of construction, department of property and supplies, John L. Hanna, secretary, will receive bids for alterations and additions to liquor store at 204 East Drinker street, Dunmore, Pa., and also to liquor store at 631 Cedar avenue, Scranton, Pa. Pennsylvania liquor control board, Harrisburg, Pa., is the owner of both of these stores.

NORRISTOWN, PA. — Montgomery county commissioners, William C. Irvin, controller, court house, will take bids May 14 on steel filing equipment and cabinets.

READING, PA.—City department of parks and public property, Gorge M. Yocum, director, and John M. Seasholtz, purchasing agent, city hall, will receive bids May 16 for construction of 20,000,000-gallon per day mechanical filter plant.

TITUSVILLE, PA.—Crew Levick Co. has awarded a contract for two 417 horsepower water tube boilers to the Titusville, Pa., Iron Works Co. as the first step in a $250,000 expansion program at the former's refinery in Titusville, Pa.

WARREN, PA.—New Process Co., is having plans prepared by Bley & Lyman, 500 Delaware avenue, Buffalo, architects, for a 3-story plant 80 x 130 feet.

YORK, PA.—New York Wire Cloth Co., care Robert Turner, 411 East Market street, is planning to construct a 1-story plant addition, 112 x 180 feet. R. A. Stair, Guardian Trust building, is architect.

Ohio

BEDFORD, O.—Bedford Distilling Co. has been organized by Charles F. Bruggemeier, and has taken over the old Mason tire factory which it will remodel into a brewery.

CINCINNATI — Republic Distillers Inc., care of Carl J. Kiefer, Schmidt building, Cincinnati, consulting engineer, plans expansion program for group of distilling, blending and rectifying plants in Kentucky including Dowling Bros. Distilling Co., Burgin, Ky., Waterfill & Frazier Inc., and Ripley Bros., both Lawrenceburg, Ky., and H. A. Tierman Inc., Louisville, Ky. The cost of these improvements, including equipment, is estimated at $500,000.

CLEVELAND—Hanna Coal Co., Leader building, has let contract to Link-Belt Co., Chicago, for four-track coal tipple at Piney Fork mines near St. Clairsville, O., including mechanical washer, to cost about $100,000.

LAKEWOOD, O.—City, B. R. Kimberly, city hall, architect, will take bids soon on a 1-story municipal machine shop and garage at 12920 Berea road, to cost about $40,000.

TOLEDO, O.—Surplus Tool & Equipment Co. has been incorporated with 250 shares of no par common stock by Fred T. Braithwaite, manager, Manufacturers' Steel Supply Co., 368 South Erie street, to deal in new and used machinery and equipment.

Michigan

DETROIT—Miller Sprinkling Systems Inc., 2335 West Six-Mile road, has been incorporated with $10,000 capital to install sprinkling and air-conditioning devices, by Austin J. Miller, 16915 La Salle boulevard, Detroit.

GRAND RAPIDS, MICH. — City is planning to purchase new boiler for city lighting plant at a cost of about $40,000.

GRAND RAPIDS, MICH.—Antrim Iron Co., 907 Michigan Trust building, is planning an addition to its plant in Antrim county.

ST. JOSEPH, MICH.—Upton Machine Co., manufacturer of washing machines, will build a 1-story addition 90 x 200 feet, to cost about $40,000.

Illinois

CHICAGO—Hercules Fastener Corp., 2242 North Racine avenue, has been incorporated to manufacture stapling machines, by Edward Krantz, Charles I. Tager and Joseph F. Bultas, Correspondent; Lloyd W. Brown, 29 South LaSalle street.

CHICAGO—Autopower Inc., 408, 15 South Hoyne avenue, has been incorporated to manufacture electric generators, motors, machines, electric appliances and devices, by S. W. Duncan, Alice M. Martin and Gerritt Ruistra. Correspondent: Leo J. Lasnier, 3180 Milwaukee avenue.

Florida

JACKSONVILLE, FLA.—Southland Dairies Inc., H. F. Lufkin, president, is planning to expand $25,000 for modern equipment, including freezing machines, packing machine, bottle washing, filling and hood capping machines.

Kentucky

JUNCTION CITY, KY.—City has loan and grant of $52,000 for waterworks. H. K. Bell, Lexington, Ky., is engineer.

LEXINGTON, KY.—Pepper Distillery, on Frankfort Pike, recently was damaged by fire to the extent of $5,000,000 including four warehouses and distilling, bottling plant owned by Schenley Distillers Corp., 20 West Fortieth street, New York.

Louisiana

JEANERETTE, LA.—City has applied for $75,000 loan for waterworks. J. B. McCrary, Atlanta, Ga., is engineer.

Maryland

CATONSVILLE, MD. — Catonsville Distilling & Distributing Corp. has been incorporated by Lawrence F. Milan, Catonsville, and George Staiger, Baltimore.

South Carolina

ROCK HILL, S. C.—Winthrop college, A. M. Graham, bursar, is planning to install three 200-horsepower boilers equipped with automatic underfeed stokers.

Virginia

GRUNDY, VA.—Norfolk & Western is planning a four-mile extension to serve coal operations of Buckeye Coal Corp., and W. E. Harman Coal Corp. at Bull Creek, near Grundy.

Colorado

DENVER, COLO.—Colorado Fuel & Iron Co., Denver, Colo., will reopen its fluorspar mine at Wagon Wheel Gap, Colo. George Botsford, Monte Vista, Colo., is superintendent of the mine.

Tennessee

NORRIS DAM, TENN.—Tennessee valley authority has acquired from Tennessee Electric Power Co. electric substation at Norris dam and plans to

install additional 1500 kilovolt-ampere transformers. Barton M. Jones, construction engineer at dam, in charge.

Missouri

MAPLEWOOD, MO.—Stok-A-Fire Co. Inc., R. F. Graham, president, has been incorporated with capital of $18,500 to manufacture and deal in stokers and accessories.

MOUNT VERNON, MO.—City is planning improvements to waterworks and also engine generating unit for light plant at a cost of $23,000. Shockley Engineering Co., 8000 Graphic Arts building, Kansas City, Mo., is engineer.

SPRINGFIELD, MO.—L. J. Kent Boiler & Sheet Iron Works Inc. has been incorporated with $30,000 capital, by E. Kent and W. J. Kent.

ST. LOUIS—Surety Products Co., W. C. Thoma, president, has been incorporated with $10,000 capital to manufacture piston rings. It has taken over the plant occupied by the Williome Pattern Co. at 405 South Broadway.

ST. LOUIS—St. Louis Spring Co., H. P. Moog, president, is constructing a new roof and skylight and making general repairs to its plant, as a result of a recent fire.

ST. LOUIS—Premier Bronze Corp., H. Rubelman, president, recently incorporated, to manufacture Premier bronze bearing metal, has installed a foundry at 1022 North Sixth street. (Noted Feb. 26.)

North Carolina

GASTONIA, N. C.—Gastonia Brush, Roller, Flyer & Spindle Co. is planning to enlarge its plant at Linwood and Second avenues, to include a machine shop.

Texas

BRIDGEPORT, TEX.—City will receive bids about May 15 for $145,000 water and sewer system. Pumping and filtration plant will be located on Trinity river near Bridgeport, and a 125,000-gallon elevated tank will be erected. Hawley, Freese & Nichols, Capps building, Fort Worth, Tex., are engineers.

DALLAS, TEX.—Dallas Brewery Inc. has been organized with $70,000 capital by Sam Leiter and Charles F. Kruse. It has leased the old plant of the Lemp Brewery at Pacific and Dundee streets, which will be remodeled and new equipment installed at a cost of $50,000.

GALVESTON, TEX.—Kane Boiler Works is constructing 115 steel tanks for installation in plant of Houston-Galveston Brewers Inc., at Thirty-third and Church streets.

LAREDO, TEX.—Laredo Machine & Supply Co. has been incorporated by Don Davers and K. D. Harrison.

District of Columbia

WASHINGTON—National training school for boys, Bladensburg road, northeast, will receive bids May 11 for installation of boilers and three stokers in its heating plant.

WASHINGTON—Bureau of supplies and accounts, navy department, will receive bids May 15, schedule 2390, one motor-driven milling machine, delivery Norfolk, Va.; schedule 2394, one motor-driven milling machine, delivery Norfolk, Va.; schedule 2398, breast and hand drills and ratchet braces, delivery Brooklyn, N. Y., and Sewall's Point, Va.; schedule 2405, portable electric drills, delivery Brooklyn, N. Y., and Sewall's Point, Va.

Pacific Coast

PORTLAND, OREG.—United States engineer has opened bids for four furnaces and boilers for the United States dredge WAHKIAKUM.

GRAND COULEE, WASH.—Contractors James Crick and Max Kuney of Spokane have begun preliminary work on the railroad extension of 30 miles to this point. The work includes an office structure 20 x 30 feet and a machine shop 24 x 30 feet.

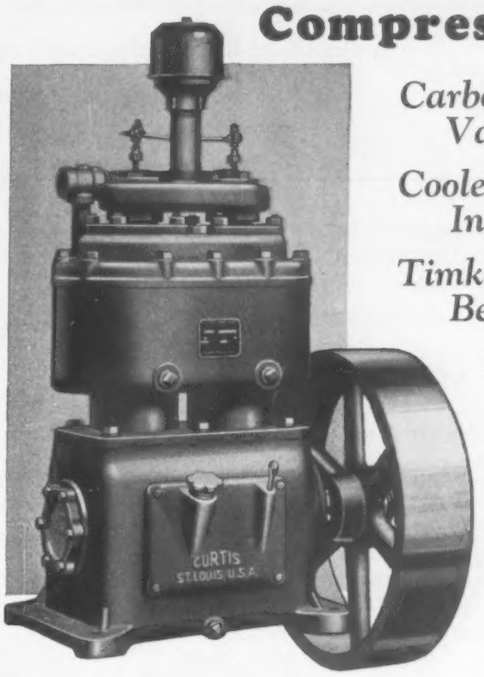
OLYMPIA, WASH.—The state has purchased a stoker from the Riley Stoker Co. for the Walla Walla prison at $2841, and will receive bids for a new boiler and stoker for the hospital at Sedro-Woolley.

PULLMAN, WASH.—Grain Growers Inc. will erect an 80,000-bushel grain elevator, estimated to cost $9000, at Fallons.

SEATTLE—Washington Iron Works is building a combination screen and flume-type dredge, involving 145 tons of steel and 160 tons of machinery for the Walker Fork Gold Corp., for use in Alaska, according to H. D. Cowden, manager of the mining company.

SNOHOMISH, WASH.—Bids will be called shortly for a water system improvement to cost $147,000, a federal loan of $100,000 having been allowed in addition to a $47,000 grant.

Greater Efficiency Increased Capacity of CURTIS Model C Compressor



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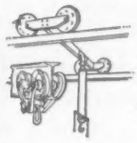

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ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

ANODES (All Types)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

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Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle, St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
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Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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Bantam Ball Bearing Co., The South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
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Shenango-Penn Mold Co., Dover, O.

BEARINGS (Journal)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt, Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Ball Bearing Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Timken Roller Bearing Co., The, Canton, O.

BENDING AND STRAIGHTENING MACHINES
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLET CHIPPERS—SEE CHIPPERS (Billet)

BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works, Co., Burnham, Pa.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., Phillipsburg, N. J.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.
Sturtevant, B. F., & Co., Hyde Park, Boston, Mass.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Murray Iron Works Co., Burlington, Iowa.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.

BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Co., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div. 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc. 16th and Rockwell Sts., Chicago, Ill.

BOXES (Annealing)
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

BOXES (Case Hardening)
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

BOXES (Open Hearth Charging)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRAKES (Electric)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BRICK (Refractory)—See REFRACTORIES, CEMENT, DOLOMITE, etc.

BRICK (Insulating)—See INSULATING BRICK